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"THIO" DRUGS IN THYREOTOXICOSIS.[1]

By HUGH R. G. POATE and S. LIVINGSTONE SPENCER,
Sydney.

ASTWOOD published the first report of the use of "thio" compounds for the control of thyreotoxicosis in *The Journal of the American Medical Association* on May 8, 1943. After investigating 106 compounds for goitrogenic activity, he ultimately selected thiourea and thiouracil as being the most active and the least toxic; finally he experimented on three human subjects, one of whom developed agranulocytosis, but eventually recovered, and in each case he reported favourably as to the control of thyreotoxicosis.

His decision to test the use of these drugs was based upon consideration of a series of seemingly unrelated observations by a number of laboratory workers. Some of the facts were as follows:

1. Cyanogen compounds (contained in the Brassica family—for example, cabbage and brussels sprouts) caused thyreoid enlargement with a lowered basal metabolic rate; but this was controlled by the simultaneous exhibition of iodine in small amounts.

2. Sodium and potassium thiocyanate used in cases of hypertension produced similar thyreoid enlargement, which was controlled by the administration of iodine and thyreoid substance.

3. Sulphaguanidine, then other sulphonamides and also various "thio" compounds were found to cause a similar thyreoid hyperplasia with a reduced basal metabolic rate; the abnormality was not affected by iodine, but was abolished by the administration of thyreoid substance.

In July, 1943, Williams and Bissell confirmed Astwood's clinical findings and reported good results in nine unselected cases of thyreotoxicosis. In *The Lancet* of October 16, 1943, Himsworth, using thiourea, also reported favourably on the results obtained in six cases. Since then numerous reports have been published in England and America, but so far the only series in Australia was one of eight cases by Frank Ritchie and Geddes recorded in THE MEDICAL JOURNAL OF AUSTRALIA on April 29, 1944.

In the literature of 1945, although an increasing number of cases have been reported, it is to be noted that there is as yet no unanimity as to dosage, length of treatment, control of various reactions or actual curative value.

Thiouracil has now replaced thiourea as the compound of choice, as it appears to be less toxic to the human being and does not impart that garlic-like odour to the breath which is so characteristic of the use of thiourea. Methyl thiouracil has now been produced, but so far only a small supply has been made available in Australia by courtesy of Genatosan, Limited; yet in fifteen cases in which this treatment is being given, no toxic effects have been observed and a favourable response has been obtained very rapidly.

In many clinics thiouracil is used as a pre-operative measure only, and there are few reports of its prolonged use. In our series of cases treatment has been used primarily to find out whether these drugs have an actual curative value in thyreotoxicosis, and it appears that at least six to eighteen months must elapse before an apparent cure is likely. Although we have or have had over 100 patients under treatment in the last two and a half years, we shall report only on those who have been observed regularly over at least six months; they total 75.

[1] This paper is an extension of one read by H. R. G. Poate at a meeting of the New South Wales Branch of the British Medical Association on October 25, 1945.

There is no doubt that the earlier a patient can be placed under this form of treatment, the quicker and more satisfactory is the final result.

Types of Case.

We can now classify our cases into five groups.

I. Acute Graves's Disease in Patients Aged Under Twenty-Five Years.

The patients in this group seem to respond fairly well, but require close observation over a long period, as in many the condition appears to fluctuate a good deal before final control of thyreotoxicosis can be established. Even after prolonged maintenance dosage, sufficient to keep the basal metabolic rate at −5% to −15%, tachycardia may persist, the gland may become enlarged and exophthalmos may increase. Several patients were finally operated on with excellent clinical results (Cases I and II). The best response seems to be in the pituitary type of Graves's disease, when the patients have not lost weight (Case III). We now find that the coincident institution of thyreoid medication prevents further thyreoid hyperplasia and diminishes exophthalmos. Idiosyncrasies and toxic effects are infrequent. There were eleven cases in this group.

II. Acute Thyreotoxicosis of Middle Age (Twenty-Five to Forty-Five Years).

There were forty cases in the second group, of which Cases IV to XI are examples. In general the response to treatment is good, but various idiosyncrasies are common and toxic manifestations may occur. As in the first group, administration of thyreoid substance may be necessary, and if there has been much loss of weight mixed vitamin therapy is advisable. If any anæmia is present, this must also be corrected.

III. Thyreotoxicosis in Later Life (Over Forty-Five Years).

There were seventeen cases in the third group. Two distinct classes of patients are recognizable: (*a*) those with the ordinary hyperplastic gland (Case XV); (*b*) those with small thyreoids seldom visible or palpable (Case XIV). This latter is the so-called "*forme frustre*", in which it seems that the thyreotrophic hormone of the pituitary gland produces a less degree of thyreoid hyperplasia with advancing years.

IV. Toxic Adenoma.

There was one case in the fourth group. We have tried the treatment in very few cases of this type, as it is our firm conviction that all such patients who are or can be made fit for surgical treatment should be subjected to operation, if only to rid the patient of a possible focus in which carcinoma may supervene. In the few cases in which we did try thiouracil, the immediate results were disappointing and toxic reactions seemed more prone to occur, so that we did not persist in the treatment.

V. Recurrent Thyreotoxicosis following either Incomplete Operation or Deep X-Ray Therapy.

In most of the six cases in the fifth group the response was good, quick and lasting; but such patients require close watching, as they do not tolerate large doses without some reaction.

Special Indications for the Use of Thiouracil.

The following are special indications for the use of thiouracil:

1. In acute Graves's disease in young patients and the acute hyperplastic toxic goitre of middle age.
2. In late-stage chronic thyreotoxicosis with lowered liver function, with or without auricular fibrillation.
3. In toxic adenoma with fibrillation, chronic myocardial degeneration, raised blood pressure, glycosuria or diabetes, as preparation for operation, which can be carried out later provided liver function is at a safe level.
4. For patients refusing operation or not suitable for operation for various reasons, including advanced pregnancy.
5. As a pre-operative treatment for patients not suitable for or not responding to deep X-ray or iodine therapy, sedation and rest. An excellent example is recorded in Case XI (Figure IV).
6. In those unsatisfactory cases in which the thyreoid gland has become hyperiodized from prolonged overdosage with iodine, and toxicosis persists.
7. In recurrent thyreotoxicosis after operation or deep X-ray therapy.

Dosage.

We consider the ideal dose to be the smallest amount of the drug which will bring about remission of thyreotoxicosis and maintain it. There is nothing to be gained in overdosage; but much harm may result from toxic effects of the drug. Each case must be a separate problem, and there is no fixed dosage, as the amount of the drug to be used depends on the response obtained, and upon whether the patient exhibits any idiosyncrasy or develops any toxic effect from its use. Basal metabolic rate estimations furnish an excellent guide to the response, along with the assessment of the patient's clinical condition. A basal metabolic rate estimation should be carried out every seven to ten days for the first three or four weeks, then every month for three to six months, and after this just when it is considered advisable. In addition, leucocyte counts, with particular reference to the number or percentage of the neutrophile cells, must be carried out every week for four to six weeks, and after that every month if all is going well. A drop in the number of leucocytes is often the first warning of a toxic reaction, and if any significant decrease occurs, treatment should be stopped and leucocyte counts carried out every day until a safe level is attained.

Thiourea.

Although thiouracil is at present the drug of choice, mention should be made of thiourea, as this was the first preparation we had for some time, and it is still used by some clinicians. Our average commencing dose was 0·5 gramme every twelve hours for three days, then every eight hours for four days, the dose being increased by 0·5 gramme every fourth day to a maximum dose of 3·0 grammes every eight hours. The increase of dose and the length of its maintenance depend on the clinical response, on the basal metabolic rate and on the leucocyte count. We used to have regular estimations made of the serum cholesterol content, but have discontinued these, as they had no other special significance than that serum cholesterol level rises as the clinical condition improves, but without any close parallel. As soon as the basal metabolic rate falls to normal limits, the dose should be reduced until a maintenance dose of 1·0 gramme every twelve hours is reached. This, in most cases, is carried on for four to six weeks, and then may be reduced to 0·5 gramme once or twice a day for some months and until such time as the patient's pulse rate remains normal, his weight is stabilized and his basal metabolic rate remains constant at ±0% to as low as −15%.

It is clearly to be remembered that both the treatment dose and the maintenance dose must be adjusted to the requirements of the individual patient, as small doses may not control the thyreotoxicosis in some cases, and yet a similar dose if unduly prolonged may induce myxœdema in others.

Thiouracil.

Our early patients were started on 0·1 gramme of thiouracil every twelve hours for three days and then every eight hours for four to seven days, after which 0·2 gramme was given every eight hours for a week; if the clinical response was slow or unsatisfactory our maximum dose of 0·3 gramme was administered every eight hours for five to ten days, after which the amount was decreased proportionately to the patient's improvement.

Early in 1945, however, we commenced treatment with 0·1 gramme every eight hours and increased the dose to 0·2 gramme after the first week, retaining this dosage until the response was definite, when the dose was reduced

gradually over some four weeks. The maintenance dose we find most satisfactory is 0·1 gramme every twelve hours for four to six weeks, and then 0·05 gramme once or twice a day so as to maintain a constant *minus* basal metabolic rate for a period of several months.

We regard treatment dosage as being anything in excess of what has been mentioned as maintenance dosage. Occasionally a patient receiving an insufficient maintenance dose may show symptoms of relapse, and should then be given treatment dosage for two to six weeks. This is one reason why the patients' condition should be checked regularly every six to eight weeks for at least six and possibly for twelve months, and in a few cases of resistance, up to eighteen months. The maintenance dose must be continued until the patient has been on a stable level for at least three months, and he should be warned to report at once any recurrence of symptoms. There is no fixed time at which the maintenance dose can be discontinued. In some cases four months' treatment seems sufficient, but other patients require up to twelve months' treatment.

Adjuvant Therapy.

For many years we have employed sedation in all cases of thyreotoxicosis, generally in the form of phenobarbital or a similar barbiturate, a half or one grain, morning and night, along with a bromide, ten grains after each meal, given in a mixture with bicarbonate of soda, fifteen grains, in order to augment the alkali reserve, which is depleted when metabolism is raised. We find it expedient to continue this treatment along with thiotherapy.

In cases of pronounced generalized hypertrophic enlargement of the thyreoid, it is advisable to administer thyroxin or thyreoid substance with a standardized content of thyroxin, as this balances the thyreotrophic hormone of the pituitary; but such treatment should not be instituted until the second or third week, when definite evidence of control by the "thio" drug is obtained. It prevents further thyreoid hyperplasia and definitely inhibits exophthalmos; but if this is present to any marked degree, it seldom recedes completely. It is rarely necessary to give more than 0·5 grain of *Thyreoideum Siccum* twice a day for two or three months.

If there is any lowering of the leucocyte count, whether before or during treatment, or if the number of neutrophile cells tends to drop, some active form of liver extract should be given regularly, as this seems to protect the bone marrow and to prevent the onset of agranulocytosis.

If there has been any pronounced loss of weight, or if asthenia is a feature of the case, a multiple vitamin preparation should be given rather than vitamin B_1 alone, as this not only conserves but restores tissue energy.

Crystalluria is uncommon; but if there is any frequency of micturition or discomfort on passing urine, the onset of strangury will be prevented and symptoms relieved by the free administration of alkalis along with extra bland fluids.

It is advisable to prohibit the eating of cabbage, brussels sprouts or cauliflowers because of their cyanogen content, which may increase thyreoid hyperplasia. Iodine should not be given during treatment with thiouracil.

Clinical Effects.

During the first two years all patients were treated in hospital for four to six weeks, as we had to proceed gradually in estimating dosage and in securing the necessary controls with regard to basal metabolic rate and number of leucocytes. Also the only toxic effect mentioned in early reports was agranulocytosis, so we had to gain our own experience (mention will be made later of toxic effects), and this is the reason why a stay in hospital was insisted on. Patients who are very ill are best treated in hospital for the first four to six weeks. A four-hourly pulse and temperature chart is kept, as a rise in either pulse rate or temperature may indicate commencing toxicosis. Slowing of the pulse rate, loss of the usual restlessness and sweating, gain in weight and a general sense of well-being should occur within the first few weeks if the dosage has been adequate. The basal metabolic rate falls steadily and the patients recover their energy. As a rule there is a steady rise in the serum cholesterol level.

In an article from the Lahey Clinic it is stated that it takes one day for every 1% rise in the basal metabolic rate before normality is reached—that is, a basal metabolic rate of +30% would take thirty days to fall to normal. This has not been confirmed by us, as often a basal metabolic rate of +20% may be slow to fall, while one of +50% may fall rapidly.

Along with other observers we have noticed a lag in the clinical response of patients who have had much iodine, and iodine should not be used with thiouracil unless operation is pending; or perhaps it may be used in the later stages of treatment if tachycardia persists when the patient is receiving a low maintenance dose.

In our earlier cases in which operation was performed when the basal metabolic rate had fallen, the gland was more difficult to handle and hæmorrhage was much more free than after the iodine method of preparation. The fascial planes did not separate as readily as usual, and perithyreoiditis similar to that experienced with hyperiodized thyreoids appeared to be present. But relatively little post-operative reaction occurred, and consequently there was less worry in the nursing of the patient. We can now confirm the findings of the Lahey Clinic that if operation is decided upon, iodine should be given in small doses coincidently with the thiouracil for one week, and the thiouracil should be stopped altogether for the last week. This reduces the vascularity of the gland and renders operation easier.

Idiosyncrasies.

The term "idiosyncrasies" is chosen to include certain minor reactions to the drug which may occur in the first week or two of its administration, but do not call for cessation of treatment.

Anorexia is common in the first week, and there may be some nausea and even occasional vomiting. Headache and mild joint pains may occur. Smarting of the eyes, lachrymation and puffy eyelids may be noted. Occasionally some enlargement of the salivary glands develops, and the cervical lymph glands may become palpable. Skin irritability or morbilliform or maculo-papular rashes have been met with. All these conditions seem to result from the overdosage and are more prone to occur with thiourea than with thiouracil; so far we have seen no reactions with methyl thiouracil.

Toxic Effects.

Toxic effects are more serious than idiosyncrasies, and may occur without warning, or may follow on various idiosyncrasies. Administration of the drug should be stopped immediately and not resumed for twenty-four to forty-eight hours after cessation of symptoms, and then only in reduced doses. A rise of temperature and pulse rate are often the initial danger signals, and now we regard any elevation of temperature of 100° F. or over as an indication for cessation of treatment until it returns to normal.

Actual toxic effects we have met with are: persistent vomiting, diarrhœa, acute generalized synovitis, urticaria, œdema of the legs, frequency of micturition, strangury, chemosis and photophobia. Leucopenia may develop, and administration of the drug should be stopped if the number of leucocytes falls below 4,000 per cubic millimetre or the percentage of neutrophile cells below 40, as agranulocytosis may develop very rapidly. Liver substance must be given and brewer's yeast has been recommended, as also has "Pentnucleotide"; but a blood transfusion gives the quickest and best result (see Case XIV, Figure V).

It was thought that agranulocytosis or neutropenia developed only in the early stages of treatment, as occurred in our own case. Pearson[6] quotes an informative case in which the initial leucocyte count was 4,300 per cubic millimetre, 45% of the cells being neutrophile. After four weeks' treatment this number dropped to 3,200 per cubic millimetre, 47% being neutrophile cells, and ten days later the number was 1,800 per cubic millimetre, 11% being neutrophile cells. A week later complete agranulo-

cytosis occurred; but the patient finally recovered. We always regard with suspicion any low initial leucocyte count and watch it carefully, administering at the same time some potent liver extract. With regard to the late development of neutropenia, Simpson[9] reports a case in which in the ninth month the number of leucocytes fell to 3,000 per cubic millimetre, with 13% being neutrophile cells; Linsell[10] reports a case of agranulocytosis occurring after four months' therapy; and Cargill and Lessea[11] report a fatal case after one year of interrupted treatment. We have had one patient develop a neutropenia after five months' treatment; the patient was then receiving a maintenance dose of 0·05 gramme of thiouracil twice a day. The number of leucocytes dropped from a fairly steady count of 6,000 per cubic millimetre with 65% of neutrophile cells to 3,600 per cubic millimetre and 37% neutrophile cells, but recovered within ten days after cessation of thiouracil treatment. The patient had been receiving regular liver therapy for the last four months, and this probably saved agranulocytosis from developing.

Results of Treatment.

Until we had a reasonable number of cases it was found difficult to assess final results of treatment; but we now have 75 cases in which it has been possible to make a regular check and determine results over a satisfactory period of time. There were 15 male and 60 female patients, and their ages ranged from nine to sixty-three years. Up to the end of January, 1946, 15 patients had been observed for twenty-one months or more, 24 had been observed for between fifteen and twenty-one months, and 36 had been observed for between six and fifteen months. We have included no cases in which less than six months' continuous observation had been carried out, although in many such cases favourable reactions have occurred.

Operation was undertaken in seventeen cases for the following reasons: (*a*) cosmetic reasons, after toxicity had been controlled; (*b*) toxic reactions, which developed in some cases so that treatment had to be abandoned; (*c*) an ultimate response, which was considered unsatisfactory in several others, mainly because of persistent tachycardia and breathlessness on exertion, even though a *minus* basal metabolic rate had been established. The condition of one patient not yet operated on is classed as unsatisfactory after eight months' treatment. If the three patients operated on for the cosmetic result are excluded, fifteen are left whose final results were unsatisfactory; thus there was a total of sixty cases in which apparent control of thyreotoxicosis was effected, as evidenced by the basal metabolic rate and clinical state—a figure which has occasioned surprise and gratification.

We refer particularly to "apparent control of thyreotoxicosis", because we do not consider that we have yet reached the stage when we can talk of "cure". In several of the elderly patients fibrillation has persisted to some extent and is not controlled by the administration of "Digoxin" or quinidine as effectively as in the cases in which total thyreoidectomy has been carried out. Also obvious enlargement of the gland persists in most cases, as does exophthalmos which has been present to a marked degree prior to treatment. Myxœdema has been seen in one case in which treatment by the drug alone was given; this patient was a man whose basal metabolic rate dropped from +31% to -42% after four months' treatment. In one case early in our series, in which standard subtotal thyreoidectomy was carried out subsequent to the drug treatment, thyreoid medication had to be instituted as the basal metabolic rate fell to -38%.

There has been no case in which tremor has persisted, and in practically every case myasthenia has cleared, while the general nervous symptoms have also abated, and the balance of the sympathetic nervous system has been restored. The weight increases rapidly and may go up to a stone or more above the average normal weight of the patient, but may fall again to the usual figure or remain six to eight pounds above it.

The general sense of well-being is maintained, most patients are back at their usual work, and many have stood up well to periods of intense physical and mental strain.

Diagnosis.

A word must be said as to accuracy in diagnosis, as we have seen many patients suffering from neurasthenia and anxiety neurosis treated with thiouracil for varying periods without any benefit. These states are frequently difficult to differentiate from thyreotoxicosis, particularly when any pronounced sympathetic imbalance exists, and an estimation of the basal metabolic rate carried out by an experienced biochemist and even repeated may be necessary in order to establish the diagnosis. The most certain method of diagnosis is the serum galactose test; but during the last four years we have not been able to secure supplies of galactose.

H. Cookson reports 66 cases divided into the following three classes: (i) obvious toxic goitre, in which he had five failures in 33 cases; (ii) probable toxic goitre, in which there were 22 cases; treatment was abandoned in two because of toxicity, and in six no improvement was obtained; (iii) doubtful toxic goitre, in which there were eleven cases, in none of which did improvement occur. Cookson's classification is peculiar; it seems clear that the six failures in the second class and the whole eleven in the third class could not have been cases of thyreotoxicosis, and this casts some doubt on the diagnosis in the five failures in the first class.

It has been suggested that failure to respond to thiouracil can be taken as a diagnostic sign that thyreotoxicosis does not exist, and from personal experience with several cases we feel that this is true.

Recent Literature.

It would appear from reports now coming to hand in the current literature that different schools are working along various lines in the use of thiouracil, and as yet there are few reports on its long-continued use as a curative measure.

At the Johns Hopkins Clinic[13] it is used much on the lines we have followed; but there they seem to administer it as a pre-operative measure for an average duration of twenty-six days and to give iodine concurrently. The dosage employed in 0·6 gramme per day until the basal metabolic rate is normal, then 0·1 to 0·4 gramme per day until operation is carried out.

The University Hospital, Baltimore[12] reports fifty cases; but only four patients were observed over a period of eight months, and they appeared normal, although treatment had ceased for two or three months. At this hospital they give "adjunctive therapy" in the form of ten grains of sodium bicarbonate with each dose of thiouracil to avoid crystalluria, dry thyreoid substance or thyroxin to balance the pituitary hormone, liver extract to protect the bone marrow, a multiple vitamin preparation to conserve tissue energy, and sedatives to control nervous symptoms. Their initial dosage is 0·1 gramme every three hours for three days, then every four hours for three to six days; after this 0·4 to 0·6 gramme is given each day until the basal metabolic rate falls, when a maintenance dose of 0·1 to 0·3 gramme per day is given. Patients referred for operation are: (*a*) patients with large colloid or adenomatous goitres which have become toxic—but operation is done then for cosmetic purposes—and (*b*) patients who cannot attend regularly for follow-up, in order that they shall run no risk of uncontrolled medication.

At the Lahey Clinic[14] 64 cases have been reported, in which the drug was used only as a pre-operative measure. All the patients were severely affected and were regarded as "bad risks" under the usual iodine medication. The average period of preparation was fifty-eight days. The thyreocardiacs were kept in hospital until compensation was established and then allowed to go home. Other patients carried on their work, but reported once a fortnight for a check leucocyte count and a basal metabolic rate estimation. Some ten to fourteen days before operation, when the basal metabolic rate was down to normal, thiouracil treatment was stopped and iodine given. All operations are now performed in one stage, and post-operative reactions and mortality have been nil. At the Lahey Clinic they consider that surgical treatment is necessary to be certain of cure.

Williams and Clute reported a series of patients, of whom 10 were observed for one year or so, 36 for eight months and 52 for only four months. Williams and Clute consider that the optimum dosage should be determined for the individual patient, and they found that excessive dosage increased the incidence of toxic effects, might cause further enlargement of the thyreoid and accentuated exophthalmos. They referred to the use of thyroxin to combat these last two effects.

Duncan Leys,[9] discussing the use of methyl thiouracil, considers it less toxic and generally more satisfactory than thiouracil. In 27 cases he had only one unsatisfactory result, the patient being a young woman who had a superadded anxiety neurosis. Apparently he has been using the drug as a curative agent, but has not had a long enough follow-up period for the final evaluation of results.

It will thus be seen that the actual position with regard to the method of use of the "thio" drugs is still in a state of flux, and until such time as a number of reports are available from observers with a large series of patients followed carefully for a year or two, we cannot expect to reach finality with regard to the many problems concerning the use of these drugs.

Misuse of "Thio" Drugs.

We have seen many cases in which use of "thio" drugs has been made without any proper understanding of their potentialities. For example, one patient was given 0·05 gramme of thiouracil twice a day for three months and was then referred for operation, the treatment being considered a failure; one patient was given 0·05 gramme of thiouracil in the morning and 0·5 gramme of thiourea at night for six weeks without result; one patient was given 0·05 gramme of thiouracil for three days and then told that operation was necessary, as her blood reaction was unfavourable, *et cetera*. Reference has already been made to the use of the drug in various neuroses without benefit.

Reports of Cases.

CASE I.—O.F., a female patient, aged seventeen years, unmarried, was a shop assistant. She belonged in the first group. This patient had had a "goitre" for four years, which had become considerably enlarged during the two months before her first attendance. There were also complaints of nervousness, palpitation and loss of weight (half a stone).

Examination revealed exophthalmos, tremor and a pulse rate of 140 per minute. The thyreoid gland was greatly enlarged and felt hyperplastic. The basal metabolic rate was +50%.

The response to thiourea was good, and improvement was at first maintained on a dose which was gradually reduced from 0·5 gramme per day to 0·5 gramme every second day. The maintenance dose was stopped after three months, and the patient quickly relapsed, the basal metabolic rate rising to +32%; so, after iodine preparation, the right lobe and isthmus of the thyreoid gland were removed. The postoperative reaction was severe. Since the operation (ten months ago) the patient had been taking 0·05 gramme of thiouracil twice a day for two months, then 0·05 gramme once a day. When last examined two months ago she was gaining weight and feeling very well. The left lobe of the thyreoid was still enlarged (Figure I).

CASE II.—P.L., a female patient, aged twenty-one years, was married. She belonged to the first group. When twelve years of age, this patient lost weight and strength and was said to have had a goitre. Three years later she underwent an operation for ligation of the superior thyreoid arteries, but her condition was worse afterwards. Later some improvement occurred, and eighteen months ago she married. When examined the patient was complaining of nervousness and palpitation. She was a young woman with a nervous manner, prominent eyes and a pronounced enlargement of the thyreoid gland. Tremor was present, and the pulse rate was 132 per minute. There were tortuous vessels leading up to the left side of the neck to the scar of the previous operation. The basal metabolic rate was +33%.

A course of thiouracil was given, which the patient tolerated well, and which led to a fall in her basal metabolic rate and an increase in weight. Apart from this her clinical response was not completely satisfactory; but she was discharged from hospital taking a maintenance dose of 0·1 gramme three times a day. A month later she had no tremor, but her pulse rate was 140 per minute. The thyreoid gland was large and soft. The maintenance dose was reduced to 0·1 gramme twice a day. Although her basal metabolic rate six weeks after this was −4%, her condition was still unsatisfactory from a clinical point of view, and it was decided to remove portion of the gland. Hemithyreoidectomy

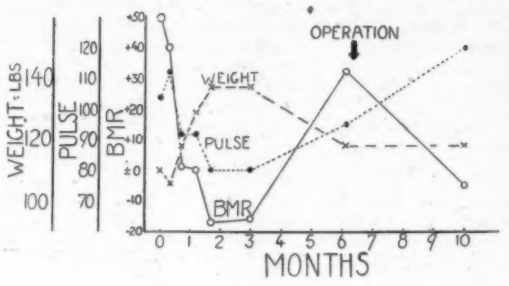

FIGURE I.

Case I. Female patient, aged seventeen years. Thyreotoxicosis treated by thiouracil. Initial response very satisfactory. Later treated by operation followed by small maintenance dose of thiouracil.

was performed, the interesting incidental discovery being made that the tortuous vessels in the superficial tissues contained arterial blood and constituted a cirsoid aneurysm. Ten weeks later the patient had lost her tremor, had a pulse rate of 100 per minute and stated that she felt "A1". Her basal metabolic rate at this time was +18%, but the patient said that she had a cold when the test was carried out. She was taking 0·1 gramme of thiouracil twice a day, and this dosage has been continued. When last examined, five months after her operation, she had no tremor and was gaining in weight.

CASE III.—S. de S. was a female patient, aged fifteen years. She belonged in the first group; her condition was of the pituitary type. She had had nervousness and prominence of the eyes for twelve months. A goitre had been present before the onset of her symptoms.

Examination revealed the patient to be a heavily built girl with exophthalmos. The thyreoid gland was moderately enlarged, with a smooth surface and firm consistency. The basal metabolic rate was +32%. The patient was noncooperative at first, but her attitude, as well as her physical condition, improved under treatment with thiouracil. She has now been out of hospital for ten months, and her maintenance dose of thiouracil has gradually been reduced during this period from 0·05 gramme three times a day to 0·05 gramme once a day. The reason for this long continuance of her maintenance dose was the persistent thyreoid enlargement. During the last four months she has been given *Thyreoideum Siccum*, half a grain twice a day; this led to a diminution in the size of the gland. Her general condition is satisfactory; her pulse rate is 76 per minute, and she is leading a normal active life. As at the last estimation her basal metabolic rate was −32%, thiouracil treatment was discontinued, but the administration of the dry thyreoid was continued. Her weight is now steady at 130 pounds after falling by 20 pounds since thyreoid medication was begun.

CASE IV.—E.M.B., a female patient, aged thirty-one years, was married. She belonged in the second group. She had complained of palpitation and of shortness of breath of twelve months' duration and of nervousness, loss of weight (two stone) and a swelling in the neck, of six months' duration.

Examination revealed exophthalmos, tremor and a large hyperplastic thyreoid. The pulse rate was 144 per minute. Iodine had been taken three times a day for six months. The basal metabolic rate was +57%.

Thiourea was well tolerated, but the basal metabolic rate fell slowly and irregularly, and the clinical response was also delayed and incomplete. Further gradual improvement occurred on a maintenance dose of 0·5 gramme twice a day; this was continued.

Four months after treatment was commenced this patient became pregnant. Three months later her basal metabolic rate was −20%, so the thiourea therapy was stopped. The patient's pulse rate remained rapid, but she went through her pregnancy and confinement without trouble. A month

later her pulse rate was 130 per minute and she had a tremor. Her eyes had remained prominent. The basal metabolic rate was +7%. When examined again six months after the confinement she was shaky and nervous, but said that she felt well. Her basal metabolic rate had risen to +22%, and it was decided to advise operation (Figure II).

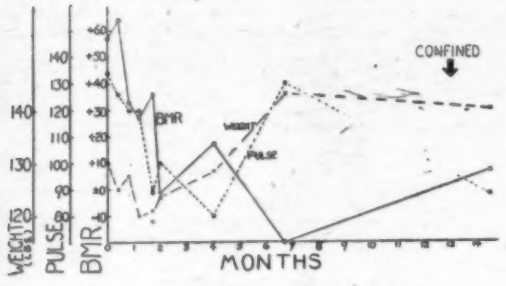

Figure II.

Case IV. Female patient, aged thirty-one years. Slow but eventually good response to thiourea. Thirteen months after commencing treatment this patient was delivered of a healthy infant, the pregnancy and labour being without incident. Six months later the patient relapsed, and operative treatment is now contemplated.

Case V.—E.V.C., a female patient, aged twenty-six years, unmarried, was a clerk. She belonged in the second group. She had suffered from palpitation, nervousness and breathlessness for five months and was upset by hot weather. No loss of weight had been noticed.

Examination revealed exophthalmos and tremor, and the thyreoid gland was uniformly enlarged and hyperplastic. The pulse rate was 160 per minute. The basal metabolic rate was +30%.

Treatment with thiourea was commenced, but after two weeks a pyrexial reaction to a temperature of 101·8° F. necessitated the suspension of the drug. Treatment was resumed three days later, but this time thiouracil was given. After six days a similar febrile effect was observed, and the thiouracil was stopped for three days. Slight diarrhœa, soreness of the eyes and a "heavy feeling" in the head were also temporarily present. On resumption of treatment the drug was well tolerated, and the clinical condition progressed satisfactorily.

This patient has now been for fourteen months on a maintenance dose, which has been reduced gradually from 0·15 gramme twice a day to 0·05 gramme twice a day. She is back at work and has gained nearly a stone in weight. Her palpitation has disappeared, but some shortness of breath is still present. The thyreoid gland has become smaller.

Case VI.—D.M.F., a female patient, aged twenty-five years, married, was a stenographer. She belonged in the second group. After developing acute thyreotoxicosis, this patient had been treated elsewhere with thiourea, and when first examined was receiving a maintenance dose of 0·5 gramme every second day. She had been able to return to work, but still complained of tiredness, depression and occasional slight attacks of palpitation.

On examination, she was found to have a pulse rate of 96 per minute and no tremor. The thyreoid gland was considerably enlarged, mainly on the left side. A few days later her basal metabolic rate was found to be −17%. The patient was instructed to continue with her maintenance dose, and after ten days' rest in bed, the left lobe of the thyreoid was removed and the thiourea treatment was suspended. Two months later the basal metabolic rate had fallen to −23%, but she had gained only one pound in weight, yet seemed well. Five months after operation she had gained a further four pounds and looked well. Her energy had returned, and she said that she felt really well.

Case VII.—E.H., a female, aged forty-five years, unmarried, was a book-keeper. She belonged in the second group. She had noticed a swelling in the neck for six months, and increasing tiredness for half that period. Her appetite had been good, but she had lost one stone in weight, and had been "nervy".

Examination revealed the patient to be a thin, middle-aged woman with prominent eyes and a restless manner. She had a tremor, and the pulse rate was 144 per minute. The thyreoid gland was slightly enlarged and felt hyperplastic. The basal metabolic rate was +58%. The patient was anxious to avoid operation, and treatment with thiouracil was started. The drug was well tolerated and the initial response was satisfactory; but the size of the thyreoid gland increased to some extent.

It is now six months since the patient finished her course of thiouracil in hospital, and she has been taking maintenance doses of 0·2 gramme, 0·1 gramme, and lately 0·15 gramme per day. The patient has been back at work, but is not quite well. Recently she developed a maculo-papular rash on her face, neck, legs and forearms, and pain in the lower limbs. The rash cleared on three occasions when the drug was suspended, but returned with its resumption.

It is proposed to try this patient on a course of methyl thiouracil with dry thyreoid, but it is thought that operation may be required.

Case VIII.—C.G.M., a male patient, aged forty years, was a farmer. He belonged in the second group. He gave a history of nervousness and of prominence of the eyes of six months' duration, with fullness in the neck for a few months. He had a pulse rate of 156 per minute, a pronounced tremor, an enlarged hyperplastic thyreoid and exophthalmos. His basal metabolic rate was +17%.

Under thiouracil treatment, which he tolerated well, his basal metabolic rate fell and his weight rose. This improvement was accompanied by a corresponding improvement in his clinical condition. For three months after leaving hospital he was receiving a maintenance dose, which was lowered progressively from 0·1 gramme three times a day to 0·05 gramme twice a day. At the end of this period his basal metabolic rate had fallen to −28%, and he had slow speech, dry skin and puffy eyes. The thiouracil treatment was suspended, and dry thyreoid extract was ordered in doses of two grains twice a day. This was given for two months, and during this time he lost eighteen pounds in weight. His pulse rate rose to 116 per minute. Thiouracil treatment (0·05 gramme twice a day) was recommenced, and one month later he was given in addition dry thyreoid (0·5 grain twice a day). This resulted in a diminution in the size of the thyreoid, and the patient said that although he had previously worn a size 17 collar, he now needed only a size 14. His basal metabolic rate recently (after an attack of tonsillitis) was +11%. His general condition is satisfactory, but tonsillectomy has been advised (Figure III).

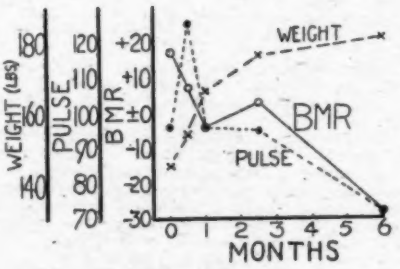

Figure III.

Case VIII. Male patient, aged forty years. Thyreotoxicosis of six months' standing; responded well to thiouracil.

Case IX.—M.M. was a female patient, aged thirty-seven years, married. She belonged in the second group.

She was first examined on July 20, 1943, when she gave a history of at first having lost a stone in weight and then having regained most of the lost weight. She complained also of nervousness, palpitation and prominence of the eyes. Her symptoms had commenced about a year previously.

Examination showed that the patient was suffering from thyreotoxicosis; she had tremor, exophthalmos and a pulse rate of 150 per minute. The thyreoid gland was neither visible nor palpable. Her basal metabolic rate was +33%.

After some delay this patient entered hospital on October 15, 1943. Treatment with thiourea, 0·5 gramme three times a day, was commenced on October 20, the number of doses being increased to four per day on October 26. On the following day the patient complained of feeling hot and expressed the opinion that she was getting a cold. During the night the temperature rose to 101° F., and on the next day to 104° F., when nausea and vomiting occurred. This

was our first experience of a febrile reaction, and administration of the drug was persisted with; but when the temperature rose during the next night to 105·8° F. it was decided to suspend the thiourea. On October 29 the temperature fell to 100° F. and the patient felt much better. A dose of 0·5 gramme was given each day for four or five days, but the temperature continued to swing between 102° and 104° F., despite which the patient's general condition improved, apart from some irritation of the conjunctivæ on November 1. The thiourea dosage was reduced to 0·25 gramme twice a day. This small dosage still provoked a pyrexial response to a temperature of 104° F., and treatment was suspended on November 3. Two days later the still smaller dosage of 0·125 gramme twice a day was started. Febrile repercussions were less pronounced, and the dosage during the ensuing three weeks was gradually increased until 0·75 gramme was being taken three times a day. Apart from a reddish papular rash lasting a few days the drug was fairly well tolerated until November 27, when the temperature rose to 103° F., and the patient complained of joint pains together with nausea and vomiting. The large joints of the upper and lower extremities were mainly affected, and pain in the back was also present.

Thiourea treatment was finally abandoned on November 28, and salicylates were administered. A gradual improvement followed; but the temperature did not return to normal for a week and joint pains persisted for a fortnight. During this arthritic exacerbation the affected joints were swollen and tender and could be moved only with pain. There was some resemblance to the joint manifestations of acute rheumatic fever, but the symptoms were rather less pronounced and there was a less satisfactory response to salicylates.

This patient was discharged from hospital on December 24. Despite these reactionary misadventures there has appeared to be some improvement in the thyreotoxic state over the last twenty months. In May, 1944, the basal metabolic rate was +7%.

CASE X.—E.M.P. was a married female patient, aged thirty-one years. She belonged in the second group.

Eighteen months previously she had been treated elsewhere with thiourea for thyreotoxicosis. The condition had been satisfactorily controlled, but she had been left with a large goitre. Surgical treatment had been advised originally, but the patient had wished to avoid operation if possible. When she was examined the patient showed no evidence of the thyreotoxic state, but she had a large diffuse goitre which she now wished to have removed. After iodine preparation a right hemithyreoidectomy was carried out without incident, and two weeks later the basal metabolic rate was −6%. Four months after the operation the patient's husband wrote as follows from the country: "She is a normal woman, and has only a slight swelling on the other side of her neck."

CASE XI.—C.L.W., a male patient, aged forty-three years, was a clerk. He belonged in the second group. His history was of palpitation of fifteen months' duration, with progressive nervousness and loss of weight (two stone). Hot weather upset him.

On examination, this patient was seen to have a moderate degree of exophthalmos and a firm, smooth, thyreoid gland. He had a pronounced tremor and a pulse rate of 136 per minute. His admission to hospital was arranged with a view to the performance of subtotal thyreoidectomy after preparation with iodine. Unfortunately this preparation was interrupted by the development of an acute streptococcal pharyngitis, but after some weeks a second attempt was made. Lugol's iodine solution was given in doses of three minims three times a day; but the patient did not "settle down", and after twenty-four days the iodine was suspended and the decision was made to attempt to control the thyreotoxicosis by deep X-ray therapy. Irradiation was carried out, but very little benefit resulted. A month later the patient's condition was most unsatisfactory, and his pulse was beginning to develop irregularities. He was readmitted to hospital and prepared for operation with thiourea, 25·5 grammes being given in twenty days. The pulse rate and other evidences of the thyreotoxic state responded satisfactorily and subtotal thyreoidectomy was performed under local anæsthesia. A moderate increase in technical difficulty was experienced from perithyreoiditis and from hæmorrhage. The patient stood the operation well, and the post-operative reaction was slight. No thiourea was given after the operation, and the patient made a satisfactory recovery and returned to work after some two months (Figure IV).

CASE XII.—S.T.B., a male patient, aged forty-seven years, was a commercial traveller. He belonged in the third group. He complained that for twelve months he had been losing weight (about one stone in all) and had not been feeling well. He had also been nervy and shaky. His appetite was good and he felt better in cool weather.

On examination, he was found to be somewhat excitable, with slightly "starey" eyes, pronounced tremor, moist skin, and a pulse rate varying from 80 to 96 per minute. His

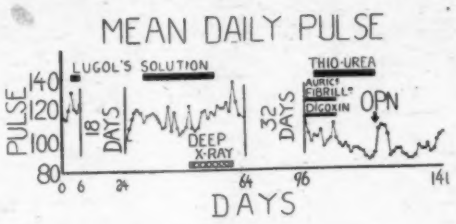

FIGURE IV.

Case XI. Male patient, aged forty-three years. Successful pre-operative preparation with thiourea after failure to respond to iodine and to irradiation.

thyreoid gland was firm, but only just palpable. His basal metabolic rate was found to be +48%. After about five weeks' delay this patient entered hospital and showed a consistent and satisfactory response to thiouracil. His thyreoid gland enlarged somewhat, but not enough to present a visible swelling. For three months after leaving hospital a maintenance dose of thiouracil was taken twice a day, the dose falling from 0·1 to 0·05 gramme. His clinical improvement was maintained, and his basal metabolic rate remained at −12%. When he was examined at the end of the three months' period it was decided to suspend the thiouracil treatment. There seemed at this examination to be some increase in supraclavicular fat, so dry thyreoid (half a grain twice a day) was ordered. He took this for eight weeks, when all treatment was suspended, as his basal metabolic rate was +11%. Two months later his basal metabolic rate was −22%, his pulse rate was 76 per minute, and his weight was 149 pounds.

This patient is back at work and his general condition is satisfactory.

CASE XIII.—W.C.B., a male patient, aged fifty-four years, was a train controller. He belonged in the third group. He had had goitre for over sixteen years, suffered from shortness of breath and had trouble with his heart. He had been ordered iodine sixteen years earlier by a physician, and had been taking ten drops of Lugol's solution per day ever since. He had lost three stone in weight during the last twelve months.

On examination of the patient exophthalmos and tremor were pronounced. The thyreoid gland was slightly enlarged, but was very hard, fixed and irregular. The heart beat was fibrillating or grossly irregular. The basal metabolic rate was +36%.

This patient tolerated thiouracil well, and showed a fairly good clinical response. His fibrillation decreased with "Digoxin" therapy, but has never completely disappeared. He has now been taking a maintenance dose averaging 0·05 gramme of thiouracil twice a day for a year, and has gained a stone in weight. When last estimated his basal metabolic rate was −6%, and he is back at work.

CASE XIV.—M.H. was a female patient, married, and performing home duties. She belonged in category (b) of the third group. She had been nervous and breathless for "some time", and had noticed a swelling in her neck three months before. She had lost two stone in weight.

Examination showed the patient to be a nervous and shaky elderly woman with prominent eyes and puffy lids. The pulse rate was 110 per minute, and the thyreoid gland was small and hard. A recent estimation had given the basal metabolic rate as +38%.

After a few days' rest treatment with thiouracil was begun. For two weeks this was taken without ill effects, although the thyreoid gland became enlarged; but then the patient commenced to complain of soreness and irritation of the eyes. She was examined in consultation by Dr. E. V. Waddy Pockley, who found conjunctival injection with chemosis and expressed the fear that a malignant exophthalmos might supervene. A few days later headache and pain in the back and shoulders developed. The first leucocyte count had been low (see Table I), and the patient's

TABLE I.

Case Number; Patient's Sex, Age (Years) and Group; Commencing Date; Duration of History.	Date.	Basal Metabolic Rate.	Weight. (Pounds.)	Basal Pulse Rate per Minute.	Leucocytes per Cubic Millimetre.	Percentage of Neutrophile Cells.	Blood Cholesterol Content. (Milligrammes per 100 Cubic Centimetres.)	Drug Used.
I. F.; 17; first. 19.5.44. 4 years.	18. 5.44	+50%	110	104	8,700	57	135	Thiourea to 30.9.44. Thiouracil from 15.2.45.
	26. 5.44	+40%	106	112	6,800	52	218	
	2. 6.44	—	—	—	9,950	71	240	
	9. 6.44	+1%	118	92	13,500	61	—	
	15. 6.44	—	—	—	11,100	69	255	
	23. 6.44	±0%	129	92	11,900	66	308	
	7. 7.44	−17%	137	80	18,500	67	330	
	14. 8.44	−16%	137	80	—	—	—	
	22.11.44	+32%	123	100	4,600	54	150	
	12. 2.45	−5%	123	120	—	—	—	
II. F.; 21; first. 13.12.44. 9 years.	12.12.44	+33%	109	120	5,000	53	150	Thiouracil.
	22.12.44	+17%	108	92	5,100	52	100	
	2. 1.45	+36%	110	88	7,100	68	135	
	8. 1.45	—	—	—	4,600	53	150	
	15. 1.45	+12%	113	88	6,800	70	—	
	22. 1.45	—	—	—	8,950	66	176	
	30. 1.45	+7%	116	110	6,000	74	125	
	13. 2.45	−6%	123	100	6,000	70	135	
	23. 4.45	−4%	125	100	6,800	59	150	
	27. 7.45	+18%[1]	122	100	—	—	—	
III. F.; 15; first. 19.1.45. 12 months	28.10.44	+16%	108	116	6,300	43	—	Thiouracil.
	11.12.44	+32%	125	100	7,600	67	—	
	22. 1.45	—	—	—	7,600	67	—	
	26. 1.45	—	—	—	6,900	54	—	
	8. 2.45	−11%	131	86	5,800	54	—	
	30. 4.45	−12%	150	80	—	—	—	
	9. 8.45	−9%	142	76	—	—	—	
	7.12.45	−32%	130	76	—	—	—	
IV. F.; 31; second. 23.3.44. 12 months.	27. 3.44	+57%	130	134	7,200	76	188	Thiourea.
	6. 4.44	+64%	125	126	10,200	57	233	
	17. 4.44	+33%	128	120	8,300	57	233	
	1. 5.44	+26%	120	120	7,000	61	323	
	8. 5.44	—	—	—	6,500	59	165	
	15. 5.44	+41%	121	88	9,000	60	263	
	22. 5.44	—	—	—	9,500	59	—	
	29. 5.44	−1%	124	100	7,500	51	240	
	5. 6.44	—	—	—	6,500	49	280	
	24. 7.44	+17%	128	80	4,900	39	210	
	9.10.44	−20%	143	130	—	—	—	
	25. 5.45	+7%	140	88	—	—	—	
V. F.; 26; second. 23.5.44. 5 months.	23. 5.44	+30%	125	140	5,700	72	210	Thiourea to 6.6.44. Thiouracil from 10.6.44.
	4. 6.44	—	—	—	15,350	77	233	
	5. 6.44	+5%	126	120	—	—	—	
	12. 6.44	—	—	—	8,500	76	225	
	19. 6.44	+2%	121	124	7,100	69	135	
	26. 6.44	—	—	—	5,350	59	180	
	3. 7.44	+3%	128	86	6,700	63	165	
	10. 7.44	—	—	—	6,100	76	210	
	17. 7.44	−17%	130	90	8,600	86	150	
	5. 9.44	+15%	138	108	—	—	—	
	30.10.44	+8%	136	110	—	—	—	
	25. 9.45	−1%	139	124	—	—	—	
VI. F.; 25; second.[2]	9. 1.45	−17%	130	76	6,200	58	158	—
	7. 3.45	−23%	129	68	—	—	—	
VII. F.; 45; second. 6.2.45. 6 months.	12. 1.45	+58%	—	—	—	—	—	Thiouracil.
	30. 1.45	—	—	—	7,600	51	—	
	7. 2.45	+29%	125	—	6,500	—	—	
	10. 2.45	—	—	—	—	—	—	
	16. 2.45	—	—	—	8,150	—	—	
	19. 2.45	+14%	—	—	—	—	—	
	21. 2.45	—	—	—	7,400	57	—	
	28. 2.45	—	—	—	8,000	—	—	
	8. 3.45	+9%	135	—	—	—	—	
	12. 4.45	+8%	—	—	7,500	58	—	
	17. 5.45	−12%	—	—	7,400	59	—	
	19. 7.45	+14%	—	—	5,300	60	—	
	15.11.45	+11%	149	—	—	—	—	
	8. 1.46	+14%	—	—	—	—	—	
VIII. M.; 40; second. 6.2.45. 6 months.	5. 2.45	—	—	—	5,400	50	165	Thiouracil.
	12. 2.45	+17%	145	96	—	—	—	
	26. 2.45	+6%	154	126	9,500	66	250	
	5. 3.45	—	—	—	6,950	66	200	
	12. 3.45	−4%	166	96	8,700	65	255	
	19. 3.45	—	—	—	6,300	71	240	
	23. 4.45	+3%	176	96	9,600	57	195	
	2. 8.45	−28%	182	72	—	—	—	
IX. F.; 37; second. 20.10.43. 12 months.	18.10.43	—	—	—	6,200	63	90	Thiourea.
	19.10.43	+33%	130	124	—	—	—	
	29.10.43	—	—	—	5,200	87	195	
	1.11.43	—	—	—	6,700	72	—	
	8.11.43	—	—	—	5,450	61	—	
	15.11.43	—	—	—	8,400	68	130	
	22.11.43	—	—	—	8,100	72	120	
	23.11.43	+23%	130	132	—	—	—	
	29.11.43	—	—	—	27,000	82	88	
	13.12.43	—	—	—	7,650	60	—	
	17. 5.44	+7%	150	84	—	—	—	

[1] Patient states that she had a cold when undergoing the test.

[2] Had course of thiourea treatment elsewhere. Subtotal thyreoidectomy on January 17, 1945.

TABLE I.—*Continued.*

Case Number; Patient's Sex, Age (Years) and Group; Commencing Date; Duration of History.	Date.	Basal Metabolic Rate.	Weight. (Pounds.)	Basal Pulse Rate per Minute.	Leucocytes per Cubic Millimetre.	Percentage of Neutrophile Cells.	Blood Cholesterol Content. (Milligrammes per 100 Cubic Centimetres.)	Drug Used.
X. F.; 31; second. (See case report.)	4. 5.44	—	—	—	10,300	61	195	
	9. 5.44	−9%	111	100	—	—	—	
	8. 6.44	−6%	114	88	—	—	—	
XI. M; 43; second. 11.5.44. 15 months.	8. 5.44	+27%	106	120	—	—	—	Thiourea.
	9. 5.44	—	—	—	7,100	63	105	
	30. 5.44	—	—	—	7,650	67	210	
XII. M.; 47; third. 28.3.45. 12 months.	13. 2.45	+48%	—	—	—	—	—	Thiouracil.
	27. 3.45	—	—	—	5,700	56	—	
	4. 4.45	—	—	—	8,700	60	—	
	6. 4.45	—	—	—	13,850	65	—	
	9. 4.45	+13%	145	64	7,000	48	—	
	19. 4.45	—	—	—	6,350	50	—	
	20. 4.45	−16%	148	—	—	—	—	
	27. 4.45	—	—	—	6,500	37	—	
	28. 4.45	—	—	—	7,400	55	—	
	3. 5.45	+1%	155	88	—	—	—	
	4. 5.45	—	—	—	7,000	52	—	
	7. 6.45	−12%	161	75	7,600	59	—	
	17. 8.45	−12%	160	80	7,200	54	—	
XIII. M.; 54; third. 11.8.44. 16 years.	8. 8.44	+36%	126	80	7,100	62	150	Thiouracil.
	14. 8.44	—	—	—	4,650	40	150	
	16. 8.44	—	—	—	6,450	51	—	
	21. 8.44	—	—	—	7,100	71	—	
	22. 8.44	+60%	123	84	—	—	—	
	25. 8.44	+32%	124	94	—	—	—	
	28. 8.44	—	—	—	5,900	62	135	
	2. 9.44	—	—	—	7,500	52	150	
	8. 9.44	+16%	126	80	—	—	—	
	11. 9.44	—	—	—	10,300	75	135	
	17. 9.44	—	—	—	8,200	58	120	
	22. 9.44	−14%	130	80	10,400	65	195	
	13. 3.45	−10%	134	84	4,500	50	165	
	7. 9.45	−6%	—	—	7,200	56	—	
XIV. F.; 63; third. 6.3.45. More than 3 months.	5. 3.45	+24%	130	80	6,100	37	135	Thiouracil.
	9. 3.45	—	—	—	6,600	53	167	
	16. 3.45	+24%	132	76	8,900	47	—	
	23. 3.45	—	—	—	4,800	57	233	
	29. 3.45	+4%	136	80	6,200	60	200	
	6. 4.45	—	—	—	3,000	9	214	
	7. 4.45	—	—	—	1,900	2	—	
	8. 4.45	—	—	—	3,400	2	—	
	9. 4.45	—	—	—	2,200	1	—	
	10. 4.45	—	—	—	2,600	0	—	
	11. 4.45	—	—	—	3,400	4	—	
	12. 4.45	—	—	—	3,400	10	—	
	13. 4.45	—	—	—	3,500	25	—	
	15. 4.45	—	—	—	2,800	49	—	
	19. 4.45	—	—	—	3,500	40	—	
	20. 4.45	+17%	135	72	—	—	—	
	23. 4.45	—	—	—	5,950	39	—	
XV. F.; 52; third. 12.12.44. 12 months.	7.12.44	+46%	102	86	6,700	70	120	Thiouracil.
	18.12.44	—	—	—	5,700	70	120	
	29.12.44	—	—	—	10,600	76	180	
	8. 1.45	—	—	—	6,800	64	158	
	15. 1.45	—	—	—	7,600	58	176	
	22. 1.45	—	—	—	4,200	48	136	
	30. 1.45	—	—	—	5,200	62	111	
	31. 1.45	+18%	90	112	—	—	—	
	5. 2.45	—	—	—	6,500	78	195	
	12. 2.45	—	—	—	6,350	72	—	
	16. 2.45	−11%	98	98	5,000	59	188	
	26. 2.45	−2%	101	86	7,200	70	190	
	5. 3.45	—	—	—	5,000	52	150	
	12. 3.45	+4%	98	80	6,000	71	157	
	19. 3.45	—	—	—	6,200	75	165	
	26. 3.45	+13%	97	88	6,500	71	165	
	12. 4.45	—	—	—	9,700	69	—	
XVI. M.; 26; fifth. 11.7.44. 12 months.	11. 7.44	+31%	148	96	17,700	77	120	Thiourea.
	21. 7.44	—	—	—	15,500	56	165	
	31. 7.44	−1%	153	76	11,300	60	225	
	7. 8.44	—	—	—	12,100	69	270	
	25. 9.44	−42%	168	70	13,600	62	300	
	15. 1.45	+23%	141	92	—	—	—	
	15. 3.45	+9%	135	72	8,200	54	—	
	14. 5.45	−9%	159	66	—	—	—	
XVII. M.; 24; fifth. 6.6.44. 10 months.	30. 5.44	+50%	123	120	—	—	—	Thiourea to 12.6.44. Thiouracil from 20.6.44.
	31. 5.44	—	—	—	5,700	46	128	
	8. 6.44	+64%	118	116	—	—	—	
	9. 6.44	—	—	—	4,700	44	135	
	12. 6.44	—	—	—	3,750	27	—	
	15. 6.44	—	—	—	7,300	60	—	
	24. 6.44	—	—	—	4,100	59	—	
	26. 6.44	+2%	118	112	7,500	57	195	
	4. 7.44	—	—	—	7,100	46	195	
	10. 7.44	+23%	123	84	5,000	51	180	
	14. 7.44	—	—	—	4,800	30	150	
	24. 7.44	+21%	126	98	—	—	—	
	31. 7.44	—	—	—	4,000	49	180	
	1. 9.44	+39%	132	100	5,200	59	135	
	16.10.44	+31%	131	108	5,500	53	122	
	15. 1.45	+2%	135	96	—	—	—	

chart had been marked: "Watch leucocyte response." The leucocyte counts had been satisfactory until after thirty-one days' treatment (9·3 grammes of thiouracil), when the count dropped suddenly (see Table I and Figure V). The thiouracil treatment was suspended, and energetic treatment was commenced with "Sodium Pentnucleotide" given by intramuscular injection, and later supplemented by blood transfusion. The intense neutropenia became complete agranulocytosis after four days, but then the leucocyte count improved fairly rapidly. The eyes remained troublesome. Three weeks after the neutrophile failure, and after the preparation with iodine, total thyreoidectomy was performed. After this the eyes and the general condition steadily improved. Three months later the patient was well, with a slow pulse rate (74 per minute) and rising weight. Her eyes were still prominent, but less puffy. She was taking dry thyreoid (one grain three times a day) (Figure V).

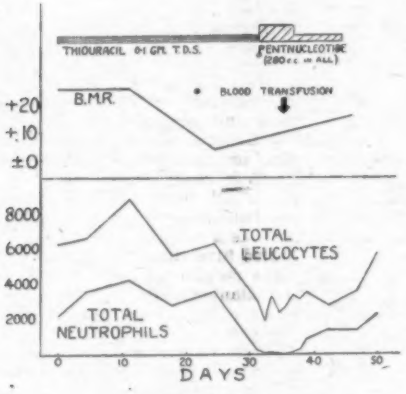

FIGURE V.

Case XIV. Female patient, aged sixty-three years. Agranulocytosis complicating treatment with thiouracil.

CASE XV.—N.M. was a married female, aged fifty-two years. She belonged in the third group. For a year she had experienced palpitations, nervousness and shortness of breath, and for three months she had noticed a swelling in her neck. Her weight had fallen from eight and a half to six and a half stone.

Examination showed the patient to be a thin, restless woman with prominent eyes and an obvious goitre. Her heart was fibrillating and the pulse rate was about 180 per minute. Œdema of the ankles was present. The patient's condition was poor, and her urgent admission to hospital was arranged; there her basal metabolic rate was found to be +46%.

She remained in hospital for five months. The fibrillation was treated with "Digoxin", which decreased but never completely dispelled her cardiac irregularity. After she had been treated for a week with rest and sedatives, a course of thiouracil was started and she took 42 grammes over a period of twelve weeks. Her basal metabolic rate at first fell in an encouraging manner, but later rose again. Her clinical condition remained most unsatisfactory; her mental state was confused, and her weight remained below the figure recorded on her admission to hospital. She got out of bed on several occasions and at times refused to take her medicines. She was also subject to severe attacks of headache of a migrainous nature.

In view of the unsatisfactory response surgical treatment was decided upon, and four months after her admission to hospital, iodine preparation having been carried out, a total thyreoidectomy was performed. Six months later this patient had gained over three stone in weight, had a regular pulse with a rate of 120 per minute, and was feeling and looking well, though she was unable to undertake much exertion. She had lost her migraine.

CASE XVI.—R.C.B., a male patient, aged twenty-six years, was a shipping clerk. He belonged in the fifth group. He had begun to lose weight some twelve months before being first examined, and was said to have lost four stone. In addition he had been nervous and tremulous. Three months before his first attendance he underwent an operation elsewhere, and the left lobe and about half of the right lobe of the thyreoid were removed. After the operation he had gained in weight (twelve pounds), but remained nervous and shaky.

On examination, the patient was found to have a pronounced generalized tremor. His skin was moist and his pulse rate was 130 per minute. Exophthalmos was present, and the right side of his thyreoid gland was much enlarged. The basal metabolic rate was +31%.

He was given thiourea, which brought about a good clinical response with no evidence of intolerance. The basal metabolic rate estimation of −42% on September 25, 1944, was not in accord with the clinical condition, which did not suggest any undue subthyreoidism. However, the maintenance dose of thiourea (0·5 gramme twice a day) was suspended, and he was given Lugol's solution, two drops twice a day, during alternate weeks. He left the city, but reported again two months later, when he seemed well, but had lost half a stone. After a further two months his condition showed deterioration; he had tremor, tachycardia and exophthalmos, and had lost another stone in weight. The residual right lobe had increased in size, and his basal metabolic rate was found to have risen to +23%.

Thiourea was again ordered, the patient being given 0·5 gramme three times a day; but three weeks later acute pain in the legs and a papular rash developed with fever, the temperature rising to 100·2° F.; the patient's admission to a local hospital became necessary. After a further three weeks the patient was transferred to Sydney. He was then prepared for operation with iodine, and on March 21, 1945, a right hemithyreoidectomy was performed. When he was examined on May 17, 1945, his condition was excellent, and he felt "A1". His basal metabolic rate was −9%, and he had gained a stone and a half in weight.

CASE XVII.—R.F., a male patient, aged twenty-four years, was a farmer. He belonged in the fifth group. He gave a history of palpitation, of swelling in the neck, and of the loss of two and a half stone in weight over a period of seven months. When first examined he was tremulous and shaky, his eyes were prominent and he had a pulse rate of 120 per minute. The thyreoid gland was much enlarged and felt hyperplastic. The basal metabolic rate was +31%.

He was admitted to hospital, and after consideration it was decided to give a course of deep X-ray therapy to the thyreoid gland. This was followed by only partial and temporary relief of his symptoms, and after a further two months he was readmitted to hospital for treatment with thiourea. His basal metabolic rate at this time was +50%. After he had been taking the drug for nearly a week (0·5 gramme twice a day), his temperature rose to 103° F., and he experienced malaise and shivering. A leucocyte count showed a total of 3,750 per cubic millimetre, only 27% being neutrophile cells. The thiourea treatment was suspended, and intramuscular injections of "Sodium Pentnucleotide" were given. In a few days the temperature fell to normal and the number of leucocytes climbed to 7,300 per cubic millimetre, 60% being neutrophile cells. Treatment was then resumed; but thiouracil was employed in place of thiourea, and was taken without ill effect. Some clinical improvement

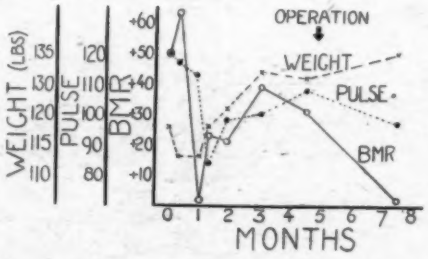

FIGURE VI.

Case XVII. Male patient, aged twenty-four years. Had been treated by irradiation with only partial relief. Thiourea and thiouracil brought about some improvement, but operation was eventually found necessary. Later maintenance doses of thiouracil were given.

followed, but the basal metabolic rate did not fall completely to normal. When the patient was taking maintenance doses his progress was indifferent, and as may be seen from Table I, the basal metabolic rate rose again.

Some months later hemithyreoidectomy was performed after iodine preparation. This has helped the patient con-

siderably; but in the twelve months since operation, although he has gained in weight, he has not been able to resume more than light work. Two further courses of thiouracil (0·05 gramme twice a day) have been given, each occupying three months (Figure VI).

Conclusion.

The early reports appear now to have given too optimistic an impression as to the value of the "thio" drugs in thyreotoxicosis and to have overlooked the toxicity that can occur with the relatively large doses given initially. "The history of thiouracil is already unpleasantly overloaded with claims for success which have had to be modified subsequently on account of toxic manifestations",[1] and we have been meticulous in our treatment of these patients, not only to avoid toxic effects, but also to avoid over-optimism in the evaluation of our results.

In the "thio" drugs we have a potent weapon for the control of thyreotoxicosis in many cases; but it is one to be used warily, with a full understanding of its possibilities and of its dangers, and one to be used only when facilities exist for regular leucocyte counts and basal metabolic rate estimations. Long-continued regular supervision is necessary before a maintenance dose can be dispensed with, and each patient is an individual problem. There is no place for rule-of-thumb methods. Operation, if undertaken, is rendered more difficult to perform; but there is little if any serious post-operative reaction. It is advisable not to be so radical in the amount of gland removed as in cases in which iodine preparation has been used, as myxœdema is more readily induced. As some confirmation of our opinion we may quote from an article by Duncan Leys,[5] in which he makes the following statement:

> The discovery of the action of thiouracil and related compounds on the thyreoid gives us the power of regulating the thyreoid activity with an accuracy quite unsurpassed by other forms of treatment for hyperthyreoidism and indeed unsurpassed in the whole field of endocrinology. For the present and until experience has fully determined the optimum condition of treatment it is best that these compounds should only be used by the specialist with full laboratory control. The follow-up is exceedingly important and should be under the supervision of the specialist also.

The question as to whether thiouracil therapy will replace surgical intervention in thyreotoxicosis cannot yet be answered on the evidence available; but it certainly looks as though it can do so in many cases. This determination, however, can be made only by one experienced in this work.

Summary.

1. Experiences with the use of "thio" drugs as a curative agent in 75 cases of thyreotoxicosis are reported, with apparent control of toxicity in 60.

2. Indications for the use of these drugs are given.

3. Dosage, adjuvant therapy, idiosyncrasies, toxic effects and results of treatment are discussed.

4. Some of the recent literature is briefly reviewed.

5. Illustrative case histories from the series are presented.

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HOSPITAL BLANKETS AS A SOURCE OF INFECTION.

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DURING recent years extensive investigations have been carried out in England and America on the problem of dust-borne infection in hospital wards and army barracks. Reference may be made among a considerable literature to the papers by Van den Ende *et alii* (1941), Spooner (1941), Garrod (1944), Wright *et alii* (1944), and Robertson *et alii* (1944), dealing with various aspects of the problem, and in particular with blankets as a source of infection. So far as we are aware, no detailed investigations have been carried out in Australia on the occurrence of hæmolytic streptococci in the dust and blankets of hospital wards. Considering the findings in other countries, and in view of the relatively high incidence of streptococcal infections of various kinds in this country and of the occurrence from time to time of the infection of surgical patients with hæmolytic streptococci, we thought that an examination of the flora of hospital wards would be of interest.

A preliminary survey, which was made in the winter of 1944, of several surgical and ear, nose and throat wards by the planting of dust samples onto gentian violet blood agar plates, revealed the presence of hæmolytic streptococci in large numbers of samples. Hæmolytic streptococci, the majority of which belonged to Lancefield's group A, were found in 88 out of a total of 122 samples examined—that is, in 72% of the samples. Throat swabs were taken at the same time from 72 persons, either patients or members of the staff, in the wards examined, and from 35 of these hæmolytic streptococci were grown. Nineteen of these strains were grouped and 11 were shown to belong to group A; this indicated that a considerable proportion of the persons examined were carrying group A streptococci at the time of the survey. A few of these people gave a history of a sore throat, but all the others were symptomless carriers. A composite dust sample taken from the sweepings of one ward gave a count of 250,000 hæmolytic streptococci per gramme. In addition, large numbers of coagulase-positive staphylococci were isolated from the dust samples.

In the winter of 1945, a more detailed survey was carried out in one general surgical ward and in one ear, nose and throat ward. This was designed to investigate the bacterial flora of the bedclothes and to correlate these findings with the presence or absence of hæmolytic streptococci in the wounds or the upper respiratory tracts of the occupants of the beds examined. It also included the examination of dust and air samples from the surgical ward.

Methods.

The apparatus used to sample the air and blankets was essentially similar to that described by Lemon (1943, 1944), with some minor differences. The flowmeter, which Lemon recommends should be made of a non-corroding metal or of a chemically inert plastic, was made of glass. It was found that broth used as a trap for the bacteria foamed excessively even when oil was added to it, and quarter-strength Ringer's solution was substituted with

satisfactory results. Ringer's solution was chosen for this purpose because of its low bactericidal value; further, if a period of time longer than half an hour should elapse between the taking of the sample and the plating of it out, there is no risk of multiplication of the organisms such as would occur in broth. By the use of Ringer's solution, the necessity of an elaborate Kjeldahl trap at the outlet of the Folin tube is eliminated, and a piece of plain glass tubing six inches in length is sufficient to catch any fluid which bubbles over. The suction was applied by an electric air pump attached to the outlet tube by a piece of pressure tubing. The assembled apparatus can be moved about the hospital and plugged into an electric power point as required. For the blanket sampling, however, the blankets were brought to the laboratory, a sterile glass funnel three and a half inches in diameter was attached to the inlet of the flowmeter with rubber tubing, and one or two cubic feet of air (the volume depending on the apparent cleanliness of the blanket) were sucked through the blanket, care being taken to go over the whole surface of the blanket with the funnel. It was noted that the blankets varied in texture, and that this variation altered the rate of air flow and also the amount of fluff removed. It was therefore always necessary to observe the rate of air intake and to adjust accordingly the time during which suction was applied. After the sample had been obtained, plates were poured from appropriate dilutions of the Ringer's solution, ordinary agar being used for a total count of the numbers of organisms present, and gentian violet blood agar for the count of hæmolytic streptococci. The counts obtained are expressed as the number of organisms per cubic foot of air sucked through the blanket. It should be pointed out that these figures do not represent the numbers of organisms present in a unit volume of blanket material, but should rather be used as an indicator of the numbers of organisms likely to be liberated during active movement of the blankets, such as occurs in bedmaking. The actual relationship which these figures have to the numbers present may be gauged by an experiment in which a measured area of sterile blanket was inoculated by spraying with a measured volume of hæmolytic streptococci suspended in broth. A count of viable organisms was performed on the bacterial suspension immediately before the spraying. The blanket was then dried and sampled by suction. In this case, approximately 5% of the numbers of organisms added to each square inch of the material were recovered for every cubic foot of air sucked through. The numbers recovered, however, vary with the texture and the age of the blanket, and it is possible that a proportion of the organisms added died during the drying period.

Results.

In Table I are set out the results of the survey. It includes the results of the sampling of the blankets, expressed as the total number of organisms and the number of hæmolytic streptococci grown from each cubic foot of air sucked through the blankets, and the results of aerobic incubation of material from nose, throat and wound swabs taken at the same time as the blanket samples. The patient's condition is indicated. It will be noted that in some cases blankets were taken on two occasions from certain beds; in three cases, these beds were occupied by the same patient on both occasions; in the others, by different patients. Blanks in the column for the wound flora indicate that the patient had no wound or that the wound had healed at the time of sampling. In a few instances, wound swabbing was omitted.

Nose and Throat Swabs.

In the ear, nose and throat ward three out of eight throat swabs yielded hæmolytic streptococci, and these organisms were also present in two nose swabs. Of the 37 throat swabs taken in the surgical ward, hæmolytic streptococci were grown from seven. No nose swabs yielded hæmolytic streptococci, although many contained *Staphylococcus aureus*. Of a total of 45 throat swabs, hæmolytic streptococci were isolated from 10 (two of these swabs came from the same patient). This is a lower incidence than that found in the preliminary survey made in the previous winter.

Wound Swabs.

Examination of the results of the swabbing of the wounds in the surgical ward are of considerable interest, as they reveal an unexpectedly high incidence of wound infection. Material from the swabs from 24 wounds was cultivated. From 19 of these swabs various organisms were grown, in many cases in numbers sufficient to indicate the presence of a heavy infection. In seven of these cases the wounds were in situations where infection would be expected (*fistula in ano*, cleft palate and osteomyelitis), and two swabbings were from ulcerations. If these contaminated wounds are excluded, there remains a total of 10 wounds out of 24 examined which may reasonably be considered to have been infected at or after operation. From 10 of these wounds *Staphylococcus aureus* was isolated, and in two hæmolytic streptococci were also found.

Blankets.

In all, 47 blankets were examined. In an occasional case, the blanket had been in direct contact with the patient's body, no upper sheet being used on the bed; in the others, the blanket nearest to the patient was chosen. The total number of blankets from which hæmolytic streptococci were isolated was 31. From eight out of nine blankets from the ear, nose and throat ward, hæmolytic streptococci were grown in numbers ranging from 90 to 390 per cubic foot of air. In the male portion of the surgical ward, 24 blankets were examined. From 19 of these, streptococci were isolated in numbers varying from 20 to 13,500 per cubic foot of air. In the female part of the ward, 13 blankets were examined and three of these yielded streptococci in numbers varying from 50 to 660 per cubic foot of air. The counts of the total numbers of organisms sucked from the blankets varied from 14,400 per cubic foot of air to 7,344,000, the lowest counts being obtained from new, unwashed blankets, from which very little of the fibre is removed during suction. The organisms grown were chiefly saprophytes, such as *Sarcina flava* and sporing aerobic bacilli; but they included *Staphylococcus aureus* and *Bacterium coli*, as well as hæmolytic streptococci. The methods adopted did not permit the isolation of anaerobic sporing organisms. The results show clearly the large bacterial load carried by the blankets.

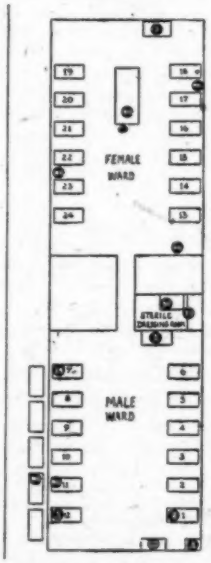

Figure I.

Plan of surgical ward showing numbers of hæmolytic streptococci isolated from various sites.

Dust Samples from the Surgical Wards.

Samples of the floor dust and the fluff of the surgical ward were taken on swab sticks from the sites indicated on the accompanying plan of the ward (Figure I). These swabs were inoculated onto gentian violet blood agar plates. The results obtained in this way are not quantitatively accurate, but are of some value in indicating the presence or absence of streptococci in the ward. Nine of the sixteen samples yielded hæmolytic streptococci in the numbers shown in the plan of the ward (Figure I). From these cultures ten colonies were picked off for grouping. Seven of these colonies were of group A, the others belonging to group G. These figures do not give the actual ratio of group A strains to other hæmolytic streptococci present, but are an indication of the presence of group A strains.

Table I.

Survey of Upper Respiratory Tracts, Wounds and Blankets in Surgical and Ear, Nose and Throat Wards.

Ward.	Bed Number.	Patient's Disorder.	Presence of Hæmolytic Streptococci.		Flora of Wound.	Blankets.		Comments.
			Nose.	Throat.		Number of Organisms per Cubic Foot of Air.	Number of Hæmolytic Streptococci per Cubic Foot of Air.	
"A2."		Bronchiectasis ..	Not sought.	Not sought.		354,000	Nil	
"Vic. 2S" (ear, nose and throat).		Mastoiditis ..	Not sought.	Not sought.	Hæmolytic streptococci.	1,200,000	135	
		Acute *otitis media*	−	−		255,000	Nil	
		Recurrent mastoiditis	−	+		1,900,000	130	
		Maxillary sinusitis	−	+		256,000	330	
		Chronic antritis ..	−	−		3,700,000	90	
		Maxillary sinusitis ..	Right nostril + Left nostril −	−		2,880,000	125	
		Mastoiditis ..	−	−		750,000	390	
		Granuloma of palate	+	+		810,000	250	
		Otitis media ..	−	−		980,000	90	
"D1" (surgical).	M1	Cholecystectomy ..	−	−	*Staphylococcus aureus.*	770,000	240	
		Removal of cervical glands.	−	−	*Staphylococcus aureus.*	819,000	20	
	M2	Thoracoplasty ..	−	−	*Staphylococcus aureus, Pneumococcus, Bacillus pyocyaneus.*	906,000	Nil	
		Appendicectomy	−	+	None—wound sterile.	846,000	110	
	M3	Lobectomy ..	−	−		150,000	Nil	Pre-operative.
		Lobectomy ..	−	−	None—wound sterile.	670,000	30	Post-operative.
	M4	Hydrocele	−	−		1,400,000	30	
		Inguinal hernia ..	−	−	*Staphylococcus aureus* (few).	323,000	Nil	New blanket.
	M5	Excision of adhesion	−	+	*Staphylococcus aureus,* hæmolytic streptococcus.	1,450,000	400	
	M6	Hernia	−	−		526,000	30	
		Nodules removed knee.	−	−	None—wound sterile.	3,230,000	810	
	M7	Hæmorrhoids ..	−	−		1,944,000	50	
	M8	Retention of urine	−	−		2,076,000	1,200	
		Fistula in ano ..	−	+	*Bacterium coli,* non-hæmolytic streptococcus.	1,150,000	440	
	M9	Plastic repair of face	−	−	*Staphylococcus aureus.*	780,000	Nil	
	M10	Gastro-enterostomy	−	−		465,000	Nil	
		For operation ..	−	−		3,176,000	110	
	M12	Cervical glands removed.	−	−	*Staphylococcus aureus,* hæmolytic streptococcus.	2,050,000	4,560	
	F13	Repair of palate ..	−	+		396,000	80	Pre-operative.
		Repair of palate ..	−	+	Hæmolytic streptococcus, diphtheroids.	642,000	Nil	Post-operative
	F14	Repair of prolapsed rectum.	−	−	*Bacterium coli.*	974,000	Nil	
	F15	Lobectomy ..	−	−		934,000	Nil	
	F16	For X-ray therapy	−	−		2,678,000	Nil	
	F18	Plastic operation to heel.	−	−		1,656,000	Nil	
	F19	Biliary colic ..	−	−		1,913,000	Nil	
	F20	Thyreoidectomy ..	−	−	*Staphylococcus aureus.*	706,000	Nil	
	F21	Mastectomy ..	−	−	None—wound sterile.	942,000	Nil	
	F22	Laparotomy ..	−	−	*Staphylococcus aureus.*	868,000	Nil	
	F23	Carcinoma of anal region.	−	−	*Bacterium coli, Bacillus proteus.*	2,450,000	50	
	F24	Resection of bowel	−	−	None—wound sterile.	2,560,000	660	Wound previously infected with hæmolytic streptococci.
	OBS	Thyreoidectomy ..	−	−	*Staphylococcus aureus.*	2,880,000	240	
	MV1	Osteomyelitis ..	−	+	Hæmolytic streptococcus, *Staphylococcus aureus,* diphtheroid bacilli.	2,046,000	13,500	On July 16, 1945.
		Osteomyelitis ..	−	−	Hæmolytic streptococcus, *Staphylococcus aureus.*	1,940,000	10,000	On July 31, 1945.
	MV3	Thyreoidectomy with tracheotomy.	−	+	Hæmolytic streptococcus.	14,400	30	New blanket.
		Ulcer on leg ..	−	−	*Staphylococcus aureus.*	7,334,000	20	
	MV4	Medial meniscus removed.	−	+		590,000	75	
		Ulcer on face ..	−	−	Hæmolytic streptococcus.	4,920,000	12,600	

The number of streptococci isolated from the various sites in the ward varied considerably, but it is interesting to note that 44 colonies were obtained from the male part of the ward and only one colony from the female part, where hæmolytic streptococci were isolated from only three of the thirteen blankets examined. Dust samples taken from the floor of the surgical dressing room where the sterile dressing trays and trolleys are prepared yielded profuse growths of hæmolytic streptococci.

Air Samples.

Air samples from the surgical ward were taken before, during and after bed-making, the samples taken from a position between the third and fourth beds (see Figure I) by sucking 10 cubic feet of air into 20 millilitres of Ringer's solution. During the bed-making all the blankets were removed and fairly vigorously handled. The samples were plated in triplicate on gentian violet blood agar and on ordinary agar, and the counts obtained are shown in Table II.

These results are in complete conformity with the experiences of other workers and indicate the rise in the bacterial content of the air during bed-making. The fact that no hæmolytic streptococci were isolated from the air may possibly be explained by the fact that the position from which the samples were taken was inadvertently one

Table II.

Results of the Sampling of Ward Air During Bed-making.

Sample Number.	Time.	State of Ward.	Number of Organisms per Cubic Foot of Air.	Hæmolytic Streptococcus
I	3.43 to 3.53	Quiet, activity at minimum.	22	0
II	4.05 to 4.15	Beds 3 and 4 being made.	636	0
III	4.23 to 4.33	Beds 5 and 6 being made; general ward activity.	510	0
IV	4.40 to 4.50	Bed 1 being made; rest of ward settling down.	158	0

adjacent to beds from which no streptococci were recovered, either from blankets or from the occupants. In a small experiment carried out in the ear, nose and throat ward in the previous winter, gentian violet blood agar plates were exposed on the floor and on the bedside lockers for thirty minutes before and during bed-making. On this occasion, hæmolytic streptococci were grown on nine out of the 10 plates exposed during the bed-making.

Discussion.

This investigation confirmed the observations made in other countries that hæmolytic streptococci are present in ward dust.

Although hospital blankets have been regarded as a source of infected ward dust and possible cross-infection, the enormous bacterial load which blankets may carry has not been emphasized. The survey did not provide proof of wound infection or cross-infection from the blankets (it was not designed to do so); but it did establish the fact that dangerous wound pathogens, particularly hæmolytic streptococci, were present in the blankets. In the five cases in which open wounds or ulcers harboured streptococci, the numbers of streptococci isolated from the blankets of these patients were considerably higher than from any others. In one open wound (a case of thyreoidectomy with tracheotomy) in which hæmolytic streptococci were present, the numbers recovered were low, but the blanket sampled was a new one which did not liberate much fibre or particulate matter.

Owing to the absence of nasal carriers of hæmolytic streptococci, we were not able to confirm the recent observations of Hamburger *et alii* (1945) in America on the potentialities of such persons to contaminate their environments. With one exception, however, the blankets from the ten patients whose throat swabs revealed the presence of hæmolytic streptococci, yielded these organisms also.

The amount of wound infection in the surgical ward was considerable, and a large number of the wounds were infected with staphylococci. Not a great deal of attention has been paid to staphylococcal wound infection, as the typing of these organisms has until recently not been on a satisfactory basis. There is no doubt, however, that this question should be more fully investigated, use being made of phage typing.

Consideration of the problems of air-borne infection in hospital wards shows that many factors must be taken into account, and that attempts at control must deal with all these, by such methods as the use of aseptic techniques in the dressing of surgical wounds and the institution of dust-laying measures such as the oiling of floors and blankets.

In view of the considerable numbers of hæmolytic streptococci which were found in the blankets examined, it was decided to investigate possible measures for diminishing the bacterial load. The size of the bacterial load is obviously correlated with the frequency of laundering of the blankets. We have found that the method of laundering usually adopted is adequate for sterilization, but the frequency of washing is insufficient. In most hospitals the blankets are not washed as a routine measure between each patient's use of them, but it is left to the discretion of the sister in charge of the ward to decide when those blankets which are not obviously dirty or from the bed of an "infectious" patient are sent to the laundry. The periods between washings of some blankets may therefore be excessively long. In any case, the woollen nature of the blankets, and the fact that their laundering is more complicated than that of linen and cotton materials, impose practical limitations on the number of washings each blanket receives during its lifetime, and on the number which may be conveniently handled in any hospital laundry.

The oiling of blankets, which has already been extensively used, does much to reduce the number of infected dust particles in the ward air, but there is no evidence that it prevents possible direct infection from blanket to wound, or that it reduces the actual bacterial load present in the blankets. The results of further investigation into the oiling of blankets are embodied in another paper.

Summary.

1. A preliminary survey of dust samples from surgical and ear, nose and throat wards showed the presence of considerable numbers of hæmolytic streptococci.

2. In a general surgical ward and an ear, nose and throat ward an investigation was carried out of the flora of the blankets, dust and air, and also of the upper respiratory tracts and wounds of the patients.

3. The blankets were found to carry a heavy bacterial load, and hæmolytic streptococci could be sucked from many of them in large numbers. A considerable amount of infection of "clean" wounds was found in the surgical ward.

4. The results of the investigation are discussed. Hospital blankets are considered to be a possible source of ward infections, and the need for finding measures to overcome this problem is emphasized.

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SPONTANEOUS RUPTURE OF THE SPLEEN, WITH NOTES ON TWO CASES.

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In actual practice three varieties of rupture of the spleen are met with. The first is rupture of the spleen associated with severe injury. This is followed quickly by collapse and death, if the appropriate speedy surgical treatment is

not forthcoming. The second variety is delayed hæmorrhage associated with rupture. There is a history of injury, followed by shock of a variable degree, and then a latent period ensues. This period may be brief, but it may be as long as three weeks before signs of internal hæmorrhage become evident. The third variety is spontaneous rupture.

The accompanying notes chiefly concern spontaneous rupture of the spleen. Spontaneous rupture of the normal spleen is an exceedingly rare event. Many pathologists consider that spontaneous rupture of the normal spleen is really traumatic rupture resulting from apparently trivial injuries. I have been told of one genuine case of spontaneous rupture of a normal spleen occurring in Melbourne. Less than twenty cases of spontaneous rupture of the normal spleen have been reported in England.[1]

Spontaneous rupture of a diseased spleen is not so uncommon in some countries, particularly countries where malaria is rife, but it is a most uncommon event in Australia. Spontaneous rupture of a diseased spleen has been recorded in malaria, in typhoid fever, in pregnancy, in parturition and the puerperium, in septicæmia, in infarction of the spleen and in blood dyscrasias.

In some pathological conditions the spleen may be so extremely congested and so exceedingly soft that even slight trauma, such as that produced by bending and twisting movements of the body, may be sufficient to damage the organ. In this way, what is considered to be spontaneous rupture may in actual fact be traumatic.

In China, where malarial splenomegaly is so common, an ingenious method of assassination, so it is said, is to cause rupture of the spleen by a comparatively minor injury. In "Manson's Tropical Diseases",[2] in connexion with splenomegaly of malarial origin, one finds this statement:

> . . . Another practical point is that these enlarged spleens are easily ruptured by a blow on the belly; this fact must be remembered in administering even mild corporal punishment to natives of malarious countries. Occasionally, the spleen may rupture spontaneously owing to rapid increase in size in the course of an attack of fever.

In Osler's "Principles and Practice of Medicine",[3] one reads the following statement:

> Special interest attaches to the rupture which may occur spontaneously or from trauma in typhoid fever or malaria. In India and in Mauritius, rupture of the spleen is stated to be common. Fatal hæmorrhage may follow puncture of a swollen spleen with a hypodermic needle. Occasionally rupture results from the breaking of an infarct or abscess.

In the following two examples, no history of trauma prior to death could be obtained. A careful search of the bodies at the autopsy, with particular reference to the thoraco-abdominal wall and the structures in the splenic area, disclosed no evidence of any prior injury. The occupation of the deceased in the first case was such that indirect violence to his spleen might have been sufficient to bring about rupture, as the organ itself was so distended and soft.

Reports of Cases.

Case I.—L.F., a roof-tiler by occupation, aged twenty-seven years, was discharged from the army in August, 1945, suffering from the effects of malaria and dermatitis. He had been in ill health on and off since, but despite this did not attend the Repatriation Department for treatment. Three weeks prior to his death, he received medical attention from a local doctor for a chill. He was working as a roof-tiler until two days before his death. On November 9 he came home from work complaining that he felt ill. Shortly afterwards he commenced to vomit. He went to bed, and ate nothing until 6 p.m. on November 10. Three hours later he had another meal. At 11.30 a.m. on November 11 he felt "sick in the stomach". A doctor was summoned, and whilst awaiting his arrivel, L.F. became rapidly worse, and was dead when the medical attendant arrived.

The history was obtained from the patient's wife; curiously enough, no mention was made of abdominal pain. The patient had contracted benign tertian malaria whilst serving in New Guinea, and was known to have suffered from an attack of malaria as late as July, 1945.

The significant facts at the autopsy, performed twenty-four hours after death, were as follows.

The body was pale; there were no external marks of violence. When the peritoneal cavity was opened it was found to be flooded with blood. There was a large amount of blood clot in the left upper quadrant of the abdomen; the spleen was greatly enlarged, and was dark in colour and extremely soft. It weighed 65 ounces. There was a large tear on the gastric surface, extending longitudinally from the upper to the lower pole. The spleen was hardened in formalin, and on being cut it was seen to be of a brick-red hue, while considerable blood clot was present beneath the intact capsule. The liver was enlarged—it weighed 70 ounces. On being cut, it was slate-grey in colour and tough in consistency. There were a few slightly enlarged lymph glands about the cœliac axis.

In a blood smear, made twenty-four hours after death, malarial parasites were found (Field's stain). Microscopic sections of the spleen were prepared and stained after the method of Tomlinson and Grocott.[4]

Histological examination showed that the capsule of the spleen was not thickened. The splenic trabeculæ were not so evident as in the normal spleen. The organ was congested, and it showed a great increase in the reticulum. There was practically no fibrosis. The spleen was packed with histiocytes. A large amount of brownish-yellow pigment, both intracellular and extracellular, was present. Malarial parasites could be demonstrated; numerous schizonts and ring-forms were present.

Case II.—S.B.M., aged twenty-seven years, a discharged serviceman, was stationed in New Guinea in November, 1944. Six months later he spent fourteen days in hospital, suffering from "pyrexia of unknown origin". His blood was examined on three occasions in May, 1945, but no malarial parasites were seen. He was discharged from the army in November, 1945; during this month he received attention for abdominal pains, of which he suffered attacks up till the day of his death. On November 27, 1945, the patient retired about 7 p.m., not feeling well; he was suffering from abdominal pains and vomiting. At 1.30 a.m. he attempted to walk to the lavatory, but after about ten steps, collapsed on the floor. He was dead on the arrival of the medical attendant shortly afterwards.

Autopsy nine hours later showed the peritoneal cavity to be filled with blood, with much blood clot in the left upper quadrant of the abdomen. The spleen was uniformly enlarged and weighed 45 ounces. The appearance of a large area anteriorly over the lower pole of the spleen suggested disintegration of this area. The capsule was peeled back from a large area over the lower pole. The substance of the gland was dark and practically diffluent. Three small separate hæmorrhages had occurred in the substance of the spleen towards the upper pole. Blood clot was found beneath the intact capsule in this area. The liver was slightly enlarged and slate-grey in colour, and felt like india-rubber. There were a number of enlarged lymph glands along the upper margin of the pancreas. In smears from the spleen no malarial parasites were seen (Leishmann's and Field's stains). In sections of the spleen, prepared and stained again by the method of Tomlinson and Grocoth, many ring-forms and schizonts of benign tertian malaria were found.

Discussion.

In a greatly over-distended and diseased spleen it is possible that the circulating toxins may so damage the congested sinusoids, pulp and capillaries as to lead to disruption and extravasation of blood. The hæmorrhage may be sufficient to burst the capsule of a greatly over-distended and diseased organ.

In the first case, the occupation of the patient would lead to acute flexion and extension of the body, together with twisting movements. Actual pressure on the abdomen with the body in the prone position might have been sufficient to damage the spleen.

Both these cases are submitted as examples of spontaneous rupture of a diseased spleen, although in the first example the spleen could have been ruptured by occupational indirect violence.

These cases have some medico-legal interest, as the condition is an uncommon cause of relatively sudden death in this country. They are of particular interest to the Repatriation Department, from the point of view of the pensions paid to the widows, especially as malaria was not diagnosed during life in the case of the second soldier.

Acknowledgements.

I am indebted to the Repatriation Department of Victoria for the opportunity to peruse the service medical records in both these cases. I am also indebted to Dr. Hilda Gardiner, of the Royal Melbourne Hospital, who was good enough to confirm the histological diagnosis of benign tertian malaria from the splenic sections.

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SOME NOTES ON WEST'S OPERATION (ENDONASAL DACRYOCYSTOSTOMY).

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Historical Review.

According to the reference in St. Clair Thomson's well-known textbook on diseases of the nose and throat, the endonasal operation for the relief of lachrymal obstruction was first described by J. M. West and L. Polyak in 1910 in *Archiv für Laryngologie*, a German publication which is not available for reference in Australia.

I first saw the operation performed by J. S. Fraser in Edinburgh after the first World War. He published his results in November, 1925; in one series of cases he had 78% of cures and in a second series 65%. I first performed the operation in 1931, on a patient who developed epiphora immediately after undergoing a radical antrostomy. I concluded that the lower end of the lachrymal duct had been damaged. Possibly it was merely a coincidence, as I have not come across or heard of a similar case. In 1933 I operated on a patient who had recently suffered from acute dacryocystitis. Both these patients have remained well, after an interval of fourteen and twelve years respectively.

Occasionally the honorary ophthalmic staff referred to me for this operation patients with lachrymal obstruction; but the numbers were too few and the intervals between operations too great for me to develop any sureness of technique or to come to any conclusion as to the value of the procedure.

However, at the end of 1942, through the good offices of the medical superintendent, at that time Dr. Norman Geaney, the honorary ophthalmic staff referred to me a certain number of patients for West's operation.

Technique.

According to Parsons, the lachrymal secretion is forced into the nose during the act of winking, when the fibres of the orbicularis contract round the sac. This was beautifully shown in the case of one patient after West's operation. After each wink, a small bead of moisture could be seen to appear suddenly in the upper part of the nose. I suppose when the orbicularis relaxes and the sac suddenly resumes its former dimensions, a certain amount of suction is exerted on the canaliculi and conjunctiva. The aim is to preserve as far as possible this pumping-suction action of the sac. If the endonasal opening which we make in the sac is too small, either it is inadequate or else it closes altogether before the edges become epithelialized; on the other hand, if too large an opening is made, the pumping-suction action is lost. It is the force of the pumping action on which we rely to keep the opening patent until the edges heal. The removal of a piece of the medial wall of the sac, in area about two square millimetres, is about the ideal aimed at. I disagree entirely with the illustrations which Fraser used for his article, and which have been reproduced in the first three editions of the Edinburgh ear, nose and throat textbook edited by Logan Turner. These show removal of practically the whole of the medial wall of the sac. The orbicularis would then have nothing on which to contract. The pumping action and the forcing of tears through a small nozzle-like opening would be lost, so that the nasal mucosa would tend to grow over the area and lachrymation would return.

Endotracheal or pharyngeal anæsthesia is used, and an airway is essential so that the return current does not bubble up through the nose. The approach to the sac is made through the frontal process of the maxilla, which is a prominent feature in the upper part of the lateral wall of the nasal cavity. The area of bone to be excised lies somewhat above the anterior end of the middle turbinate. Should the upper part of the septum encroach on this region, it should be resected, as adequate working room is essential. Hæmostasis is obtained both by painting of the surface of the mucosa with cocaine and adrenaline, and by the injection of a few drops of adrenaline and saline solution underneath it.

The mucosa elevated by the injection is now removed (special instruments have been made for this purpose, but any elevators for septum resection do equally well), and the bone is thus exposed. A semilunar piece is now removed by the placing of the point of a gouge about three to five millimetres anterior to the posterior border; a special gouge has been made with a narrow handle, so that the point can be kept in sight, but any small mastoid gouge suffices.

The assistant wields the mallet, as at this stage both the operator's hands are engaged, one holding the speculum and the other the gouge. When the point of the gouge is felt to cut through the bone, it is withdrawn and replaced at the extremities of the cut, which are then extended dorsally until the posterior border of the frontal process is reached. A final *tour de force* with the point of the gouge dislodges the severed piece of bone into the nostril, from where it is removed.

Sometimes in cases of long standing, in which the sac is infected and much dilated, the point of the gouge buttonholes the sac when cutting through the bone. When the severed piece of bone is removed, a stream of pus can be seen running into the nose. The operation is thus completed. When this happy event does not occur, the next step is the removal of a small piece of the medial wall of the sac, whose greyish-white colour can be seen through the gap in the bone. The difficulties of this vary enormously. In cases of long standing, in which the sac is dilated and the wall thickened from chronic inflammation, the intrusion of the medial wall into the nostril through the gap in the frontal process is extremely easy. Conversely, when the sac is small and thin-walled, it can be very difficult. A few flakes of the lachrymal bone may need to be detached, and as further hæmostasis is generally required at this stage, more cocaine and adrenaline are applied. While these drugs are acting, work is transferred to the punctum, which is dilated, and a lachrymal duct probe is passed through the canaliculus into the sac.

It is essential for the success of the operation to make certain that the end of the probe really does enter the sac and is not held up in the canaliculus. In several cases stenosis was encountered at the sac end of the canaliculus. If the operation is persevered with when this condition is found, the lateral wall of the sac becomes intruded into the nose, as well as the medial wall, and too much of the

sac wall is apt to be removed, so that the pumping action is spoilt. If any doubt or difficulty is experienced in entering the sac through the lower canaliculus, attention should be transferred to the upper, which is generally found to be unobstructed. It should be the responsibility of the ophthalmic surgeon to see that the canaliculi are not obstructed before referring patients for West's operation.

The endonasal opening of the sac is now dealt with. Gentle pressure on the probe causes the medial wall of the sac to intrude into the nostril through the gap in the bone. Two procedures are now open to the surgeon. In the first, an incision is made in the wall with a paracentesis or a small Bard-Parker knife, and one blade of a specially made small fine-tooth forceps is passed into the sac through the incision. The other blade is outside. The probe is withdrawn, the blades are closed and the piece of sac wall between the blades is excised. This method is successful when the sac is of the dilated variety, in which plenty of tissue is available for manipulation; but in the case of the small type of sac the method may be disastrous, as the point of the probe immediately slips through the incision, the sac recedes through the opening and it is often impossible to pick it up again. I prefer the second method. In this the sac is seized just below the point of the probe with a pair of forceps, the probe is withdrawn and the knife is passed laterally to the forceps, the seized portion being cut off. I have found that a pair of aural forceps, known as Hartmann's polypus forceps, is ideal for this purpose. It has a small pair of cups, acting laterally, which have a strong hold and are small enough to grip the sac without seizing the end of the probe as well. With either method, a small piece of wall, between one and two square millimetres in area, is removed. During the above endonasal manipulations, both the surgeon's hands are engaged with forceps and knife, and the assistant can be of great help at this stage by holding either the probe or the speculum.

After the operation, no packing is inserted, as there is little hæmorrhage. Neither is probing carried out, as the action of the orbiculares keeps the opening patent. If the opening has not been made large enough, no amount of probing does any good. In those cases in which resection of the septum has been performed at the same time to facilitate approach, packing is then used to prevent the formation of a septal hæmatoma. If possible, the packing should be kept below the sac area, as its pressure may prevent the fistula from opening during winking. It should be removed as soon as possible.

Causes of Failure.

Failure occurs in those cases in which (i) the sac is so small and the wall so thin that the probe punctures the medial wall when intrusion into the nostril is attempted, (ii) the opening made is inadequate, and (iii) stenosis is present at the canaliculus-sac junction, so that part of the lateral wall is removed as well as the medial wall. In cases in which the sac is dilated and thick-walled, failure is practically impossible.

Results of Operation.

Thirty-eight patients, in both public hospital and private practice, have been subjected to operation; four patients had both eyes affected, so 42 sac operations were performed; 31 patients were relieved and 35 sac operations were successful. In the seven cases which were failures, two patients state that their condition has been much improved; whereas formerly the affected eye was almost constantly wet, it is now almost constantly dry. One patient states that the eye waters only when she is out in a strong wind or when she becomes excited. The other patient states that the eye still waters when she has an attack of hay fever, to which she is subject. I have put these two "improved condition" cases amongst the failures, as I understand that this is about the result achieved when the sac is excised in the usual way; of course the whole object of West's operation is to restore the eye to complete normality, so that it is dry under all conditions.

One elderly woman, whose operation was a failure, complained of much pain around the operation area for months afterwards. This is unusual. As a rule, post-operative pain and discomfort are temporary. Not every patient was relieved at the first operation; several had to be operated on a second time, and one patient, a child, had three operations before success was achieved.

On the whole, I think that the results in this series of cases are reasonably gratifying, especially when consideration is given to the fact that most of the cases were of recent onset. As has been explained previously, in such cases the sac is small and thin-walled, and endonasal manipulations are thus rendered more difficult. It is in this type of case that the ophthalmic surgeon prefers to refer the patient for West's operation, reserving for excision of the sac cases of long standing in which infection is present. Were these patients referred for endonasal operation, 100% success could be achieved, as in their case operation is easy.

The results have been particularly gratifying among children.

The youngest patient was an infant, aged two and a half years, who had had lachrymal obstruction since birth and who had been unrelieved by the usual probing and syringing. Recent examination, two years after operation, shows that the relief obtained has been permanent.

Another child was a boy, aged seven years, whose eye had always been full of pus since soon after birth. Every morning when he woke, the eye had to be bathed open. Once a year the child had been anæsthetized for probing of the duct and syringing of the sac. The mother stated that the child had an inferiority complex, did no good at school and was a nervous wreck from dread of the yearly procedure. The eye was dry immediately after operation and has so remained. The mother reports that the boy's personality and outlook on life have completely changed, and he is now top of his class.

Both these children were shown at a clinical demonstration at the hospital during the last annual meeting of the Royal Australasian College of Surgeons.

Another child, aged four and a half years, was also submitted to operation. Obstruction had occurred after a fall in which the nose had been broken. This proved to be a difficult case, as much bony thickening was found in the lateral nasal wall in the region of the sac. It was this patient who required three operations before success was achieved. This child lives in the country, and to my recent inquiry the mother replied that the eye has never given a moment's trouble since the last operation two years ago.

Adults have been most grateful for the relief afforded. Some find the lachrymation most distressing. Either constant mopping of the eye is required or the eyes become suffused with tears at the most awkward times and clear vision is prevented, especially when the patient is sewing or reading.

One adult, a male, was in great distress. His occupation, that of a commercial traveller, necessitated much driving, and he was in constant fear of an accident, especially when in the city. He often had to stop his car altogether, wipe his eyes and wait till the lachrymation had subsided. He thought that he would have to change his occupation. Both eyes were affected. At operation the sacs were found to be small. One eye was relieved, and in the other lachrymation continued. A second operation three months later achieved success. Both eyes remained dry, and he can now drive his motor-car in comfort.

Conclusion.

From this small series of cases, it would appear that this operation should have a place in the technique of the rhinologist. It seems a pity that more interest is not taken in this operation by nasal surgeons, as it is of much the same type as septum resection. Ophthalmologists could be guaranteed good results in cases of long standing in which infection is present, as in these operation is easy. In the cases in my series in which pus has been present, infection seems to clear up rapidly, or else the sac continues to discharge into the nose. Once the opening in the sac wall is made, purulent secretion never flows back into the eye against the current of tears. Nevertheless, if the question of cataract extraction arose in a such a case, for safety, excision of the sac would have to be carried out.

Where sac excision gains over West's operation is in its comparative simplicity. It can be done with local anæsthesia, whereas West's operation requires general anæsthesia, and if the septum has to be resected, post-operative plugging of the nose is required for twenty-four hours. In spite of these drawbacks and difficulties, that West's operation is gradually supplanting sac excision can be seen from perusal of the annual reports of the Eye and Ear Hospital over the last three years. In 1943 there were 43 sac excisions, in 1944 there were 40, while in the last year there were only 39. I feel sure that an even wider use of West's operation would greatly reduce the amount of lachrymation in this vale of tears.

Acknowledgements.

I desire to record my thanks to the former medical superintendent, Dr. Norman Geaney, and to the honorary ophthalmic staff of the hospital, for referring patients to me, to give me an opportunity to try out this operation.

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NEW CONCEPTIONS OF MALARIA CONTROL.

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Sydney.

The time has come for us to adjust our ideas on the problems of malaria control, in view of the new drugs and insecticides at our disposal. The special article on "Paludrine" recently contributed by the Land Headquarters Medical Research Unit[1] opens the way.

It is obvious that "Atebrin" is passing out of the picture. In its pre-war dosages it was not satisfactory, and although the dosages and routine evolved by Fairley[2] for use in the Army were the complete and triumphant answer to the war-time problem, two difficulties are now apparent. The first is that without the very strictest military discipline "Atebrin" would have failed; and nothing comparable to this discipline will be possible in peace-time practice. The second is that the risks of toxic effects of the recommended doses of "Atebrin" administered over long periods could be taken in the Army in war-time, but they are not justifiable in civilian practice, even if the civilians themselves were willing to take them. Quite correctly, these effects were discounted and even denied when the need for taking "Atebrin" was vital, but the first paper on the untoward reactions attributable to "Atabrine" has now been published by Livingstone and Dieuaide,[3] and there are more awaiting release. However, if "Paludrine" turns out as well as it promises, such discussions might profitably be allowed to lapse.

"Paludrine" is cheap and easy to manufacture. Its therapeutic dose is 0·1 gramme; 0·025 gramme has been used effectively on occasion; yet 1·0 gramme daily for fourteen days caused no harm. It remains to be seen whether there will be any toxic effects when it is taken in suppressive doses over a period of many years, and whether it is suitable for women and children. These are not mere quibbles, but reasonable reservations; a year or more must elapse before even the simplest of the questions that inspire them can be answered; but there is no reason why we should not immediately give some thought to the great possibilities that the three main attributes of "Paludrine" seem to indicate:

1. It is a true causal prophylactic against malignant malaria, and a complete suppressant of benign tertian fever, in a dosage of 0·1 gramme twice a week. This means that where "Paludrine" can be taken prophylactically by a whole community there will be no need for vector control, and *Anopheles* will be relegated to the status of a mere nuisance-mosquito.

2. In the prophylactic dosage, although it is not a gametocide it prevents development of infection in the mosquito. Because of this, we are entitled to envisage whole countries cleared of malaria, but the time is not yet, since the administrative difficulties would be immense.

3. A single dose of 0·1 gramme ends an attack of either benign or malignant fever and brings the temperature to normal. This is the end of hospitalization, of malarial cachexia, of malarial abortions, of heavy infantile mortality due to cerebral malaria, of enlarged, easily-ruptured spleens, and of blackwater fever.

Unfortunately, in actual practice we cannot proceed to the wholesale exploitation of these attributes of "Paludrine" without first considering certain other circumstances. In the case of the white man in the tropics the matter is simple. Merely by taking 0·1 gramme twice a week he can avoid all effects of malarial infection. That he may retain a suppressed benign tertian infection which will break through some time after he ceases taking "Paludrine" is of little moment—he can continue taking "Paludrine" whenever he is on holidays, and when he finally leaves the tropics for good he can let the malaria break through, and have it cleared up quite easily with the aid of quinine.

Fully-organized communities, provided their geographical situation permits, can take advantage of the second attribute mentioned above. There need be no repetition or continuance of the recent outbreak of malaria in Cairns, for instance; and, once the mess in Europe has been cleaned up, countries such as Holland will find in "Paludrine" the solution to many of their problems. But in the unorganized native countries enthusiasm must not be allowed to outrun discretion, because there are important epidemiological factors which must be given full consideration. It must never be forgotten that the problems presented by the indigenous native are entirely different from those presented by introduced populations, either white or coloured. Further complications arise in countries like Malaya, with its Malays, Chinese and Tamils; even in New Guinea there cannot be one single policy laid down for the Papuans and for the true Melanesians of the Mandated Territory. The indigenous inhabitants of malarious districts carry a heavy chronic infection, and survive only because of the tolerance which this gives them. They are continously exposed to massive reinfections, from which even their high tolerance does not completely protect them. To eliminate their chronic infection over a period of a few years, by any means, would be to lower their tolerance; if then their means of protection were withdrawn, exposure to reinfection would result in many deaths. The outbreak in Ceylon in 1934-1935 gave ample proof of this, even though there the protection was given only by anti-mosquito works which were very effective under ordinary conditions, but which were unable to cope with an abnormal season. It is a fact that we possess no effective means of controlling mosquitoes completely and permanently; but in "Paludrine" we now have a means of controlling infection, both in man and in the mosquito, so long as it is taken regularly. If, then, it is given regularly to natives for a period of a year or more, they will undoubtedly be benefited, but as soon as it is discontinued they will be exposed to serious risk. It might even be laid down that once a native has taken a prolonged prophylactic course of "Paludrine" he should not cease taking it for the rest of his life. To arrange this for individual natives is a task beyond any administration having the care of large numbers.

Even if a large community is treated so thoroughly that the local mosquitoes cease to be infected (which could be done by giving two doses a week to every inhabitant for six months), there can be no guarantee that the treatment could be carried on indefinitely; hence such treatment should not be undertaken unless the locality is geographically isolated, and unless it is possible to treat all newcomers before they can reintroduce the disease.

Thus a safe general rule would be that no prophylactic treatment should be given to the indigenous natives of a

malarious district; when an attack of fever breaks through their tolerance, it should be treated effectively (and because of the tolerance, it will respond rapidly to simple treatment), but no attempt should be made to eliminate the chronic infection which is invariably present. A single dose of 0·1 gramme of "Paludrine" should be sufficient.

Normally, only massive new infections initiate an attack of fever in a tolerant native (unless, of course, intercurrent disease lowers his resistance). These can be guarded against by local mosquito control, and here the new insecticides have their place. Recently Buxton[4] and Ribbands[5] have shown that a 5% solution of "D.D.T." in oil, used as a larvicidal spray, is needed in only one volume per acre as compared with ten volumes of untreated oils. Aeroplane spraying is the most efficient method, and kills both larvæ and adults, but it is economical only over very large areas. Regular spraying by aeroplane once a fortnight should give very good control, but with hand spraying it might be necessary to apply it as often as once a week. Where dusting is necessary, however, Paris green is superior to "D.D.T.", for purely mechanical reasons. For spraying houses, "D.D.T." is either applied to walls and ceilings every two months as a 5% solution in kerosene, or incorporated in the interior house paint. A residual spray is well suited to the rough, unfinished surfaces of native dwellings, and will prove to be far more effective in controlling mosquitoes than either gauzing-in the houses or supplying mosquito nets—no natives ever use these devices properly, anyhow. For smooth surfaces one coat of "D.D.T." paint can be regarded as a permanent protection. Once a mosquito has come into contact with "D.D.T." it probably never bites again, since it very shortly becomes upset, although it may not die for several hours.

The only unrestricted information about "666" available to the writer is contained in a lecture given by Dr. Roland Slade.[6] He states that it is at least as effective as "D.D.T.", and can be used as a 5% spray in various solvents, as a dust, or as a fumigant when volatilized from hot plates; the last method also leaves an effective residue on walls. It acts by replacing the essential metabolite inositol and "blocking" cell activity. Its effect extends over the whole of the Phylum Arthropoda, whereas "D.D.T." appears to be limited to the Class Insecta.

There remains a further problem. It might be necessary to send natives for short periods into areas of hyperendemicity where "D.D.T." cannot be used effectively. To protect them from massive infections which would undoubtedly swamp their tolerance, they can use di-methyl phthalate, the completely effective mosquito repellent which was developed for the Army. (No "unrestricted" references are available to the writer.) A few drops rubbed over exposed skin gives protection for at least two hours. In addition, there can be no objection under such conditions to giving "Paludrine" prophylactically for a few weeks.

To summarize, all introduced, non-tolerant inhabitants of malarious districts should take 0·1 gramme of "Paludrine" twice a week; but it is preferable that the indigenous natives should not have their acquired tolerance interfered with in this way. They should receive only the minimum treatment (a single dose of "Paludrine") necessary to control their occasional attacks of malarial fever. To protect the indigenous natives from new, massive infections which would overcome their tolerance, mosquitoes should be controlled by the use of "D.D.T." or "666"; as temporary measures, where these insecticides cannot be used effectively, protection should be given by di-methyl phthalate and short prophylactic courses of "Paludrine".

It may seem a terrible thing, after listing all the glowing possibilities that "Paludrine" offers, to advise restricting its use among natives. Undoubtedly, if natives could be relieved of the heavy physical and mental handicaps which malaria imposes on them, they would progress further in two generations than they have during the last several centuries. Such a consummation is greatly to be desired, but, unfortunately, the dangers of interfering with malarial tolerance without at the same time permanently eliminating the possibility of later reinfection are very real indeed. In no native country are there administrative facilities capable of carrying out the necessary work in its entirety; and far too often in the past have we seen a short-term policy result in disaster. In any case, long before malaria elimination can become a reality, the increase in births and decrease in mortality due to widespread use of single therapeutic doses of "Paludrine" will be setting up problems of overcrowding and food shortage which will need to be solved before anything further can be attempted.

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(2) N. Hamilton Fairley: "Chemotherapeutic Suppression and Prophylaxis in Malaria", *Transactions of the Royal Society of Tropical Medicine and Hygiene*, Volume XXXVIII, 1945, page 311.

(3) C. S. Livingstone and F. R. Dieuaide: "Untoward Reactions Attributable to Atabrine." *The Journal of the American Medical Association*, December 15, 1945, page 1091.

(4) P. A. Buxton: "The Use of the New Insecticide D.D.T. in Relation to the Problems of Tropical Medicine", *Transactions of the Royal Society of Tropical Medicine and Hygiene*, Volume XXXVIII, 1945, page 367.

(5) C. R. Ribbands: "The Use of D.D.T. as a Mosquito Larvicide on Still Waters." *Bulletin of Entomological Research*, Volume XXXVI, 1945, page 253.

(6) R. Slade: "A New British Insecticide" (Hurter Memorial Lecture), *Chemical Trade Journal*, Volume CXVI, Number 3017, 1945, page 279.

Reports of Cases.

A CASE OF TICK TYPHUS IN NORTH QUEENSLAND.

By J. BRODY,

Gordonvale, North Queensland.

SCRUB TYPHUS is well known in the North Queensland coastal area, and an occasional case of murine typhus is also encountered. The following case, however, appears to be worth reporting, as it differs both clinically and serologically from scrub typhus and murine typhus.

Clinical Record.

E.C., a female patient, aged fifty years, had been living in an area of secondary scrub for about eight weeks. During that time she stayed in and around the house, but on August 4, 1945, she went into the scrub to collect wood. On August 7 she felt off colour, and that evening she had a chill. This was repeated the following night and again on August 9. The next day she complained of a severe occipital headache, and on August 11 a rash appeared, and she reported to the Gordonvale Memorial Hospital, to which she was admitted.

On her admission to hospital, the patient's temperature was 103° F. and her pulse rate was 98 per minute. The temperature rose to a maximum of 104° F. and ran a remittent course, falling by lysis and reaching normal on the twelfth day of illness. The pulse rate remained relatively slow throughout. There was a widespread papular rash on the trunk and extremities, the hands and face being unaffected. Each efflorescence was about five millimetres in diameter and raised about 0·5 millimetre above skin level; the colour was dark red, but not livid. The rash persisted throughout the illness and was still faintly visible when the patient left hospital on the seventeenth day. There was no eschar. All regional lymph glands were slightly enlarged, but not tender. No cough was present, nor were any accidental sounds heard over the lungs. The headache persisted for two days after her admission to hospital, but thereafter the patient felt well. Throughout the illness she did not appear so ill as is usual in scrub typhus in this area. There were no recurrence or complications, and she was discharged from hospital, well, on August 24.

Serological Findings.

Serum was collected on the seventh, fourteenth and twenty-first days of illness, and submitted for agglutination tests to the Commonwealth Health Laboratory at Cairns. The results are shown in Table I.

Table I.

Specimen of Serum.	Agglutination Titre.	
	Bacillus Proteus OX2.	*Bacillus Proteus* OX19.
Seventh day	1:160	0
Fourteenth day ..	1:640	1:80
Twenty-first day ..	1:1,280	1:160

Comment.

There is a considerable increase in the titre of agglutination against *Bacillus proteus* OX2 and a smaller increase in the titre against *Bacillus proteus* OX19. This is in marked contrast to the findings in scrub typhus, in which the serum will agglutinate *Bacillus proteus* OXK to a significant titre.

Clinically and serologically, this case appears to belong to the category of tick-borne typhus, although no history of tick bite is available. Cilento[1] states that no member of this group is known to be present in Australia, and that in this group the Weil-Felix test produces, not a strongly positive reaction, but a slightly positive reaction with two strains of *Bacillus proteus* (OX2, OX19). In this case, however, the Weil-Felix test produced a strongly positive reaction with *Bacillus proteus* OX2 and a less strongly positive reaction with *Bacillus proteus* OX19. It would appear, therefore, that this case, although probably belonging to the category of tick-borne typhus, constitutes a separate entity within this group. The clinical course resembled that generally described for the *fièvre boutonneuse* of the Mediterranean littoral.

Summary.

A case of typhus is described which is thought to belong to the category of tick-borne typhus.

Acknowledgement.

I have to thank Dr. E. H. Derrick, of the Department of Health and Home Affairs, Brisbane, for his help and encouragement.

Reference.

[1] R. Cilento: "Tropical Diseases in Australasia", 1940.

STAPHYLOCOCCAL MENINGITIS AND VENTRICULITIS: CURE BY PENICILLIN.

By Douglas Miller,
Lieutenant-Colonel, Australian Army Medical Corps,
and
H. J. Delohery,
Captain, Australian Army Medical Corps.

(From the Neurosurgical Centre at an Australian General Hospital.)

Clinical Record.

The patient, a soldier, aged twenty-four years, was wounded in action by a machine-gun bullet, which entered the right occipital region. The first treatment was given ten hours after injury, and *débridement* was carried out with removal of mashed brain and enlargement of the bony deficiency. Penicillin and sulphonamide powder had been applied to the whole area; the wound was sutured, and he was given penicillin intramuscularly, 15,000 units every three hours. On the ninth day after injury cerebro-spinal fluid was noted escaping from the anterior margin of the wound, and hæmolytic *Staphylococcus aureus* was recovered from the margins of the cerebro-spinal fluid fistula. The patient was found to have a left homonymous hemianopia. On the twenty-fourth day after being wounded he complained of severe headache and was pyrexic and had neck stiffness, and the plantar response on the left side was equivocal. Lumbar puncture was performed, the cerebro-spinal fluid contained 1,180 polymorphonuclear cells per cubic millimetre and the protein content was 160 milligrammes *per centum*; no growth of microorganisms was obtained from the fluid.

The patient arrived at the neurosurgical centre twenty-six days after his injury, having received 2,980,000 units of penicillin intramuscularly. He was drowsy and somewhat irritable. His temperature was 101° F. He was not sufficiently cooperative for a complete examination of the nervous system to be made. Visual inattention was present in the right homonymous field, and no other obvious nervous signs were found. He had some neck rigidity, and Kernig's sign was elicited. A long healed scar was present in the right occipital region, at the anterior margin of which was a small opening which discharged cerebro-spinal fluid freely and a small amount of pus intermittently. There was a large area of bone deficiency beneath the scar, and a tense brain hernia was present.

On lumbar puncture, the cerebro-spinal fluid pressure was 150 millimetres. The fluid was turbid, and 25 millilitres were removed slowly with no alteration in pressure; 30,000 units of penicillin were injected intrathecally. The fluid contained 7,400 leucocytes and 1,600 lymphocytes per cubic millimetre.

Penicillin therapy was maintained, 20,000 units being given intramuscularly every three hours, except at night, when a single dose of 100,000 units was given.

On the twenty-seventh day after injury there was very little change in the patient's condition, except that the neck rigidity was more pronounced. On lumbar puncture, the pressure of the cerebro-spinal fluid was 100 millimetres, and the fluid was turbid; 100,000 units of penicillin were injected intrathecally. The fluid contained 7,000 leucocytes and 3,150 lymphocytes and mononuclear cells per cubic millimetre. Cultivation produced a scanty growth of hæolytic *Staphylococcus aureus*.

On the twenty-eighth day the patient's condition was no better, and it was decided to explore the wound area. "Pentothal" anæsthesia was used, and a small amount of degenerate brain was found beneath the lateral margin of the wound near the fistulous opening; but no collection of pus was located with the brain needle. An incision was made beneath the medial margin of the wound, and a brain needle was passed through the bone deficiency into the right lateral ventricle. The fluid was turbid, and a replacement of 20 millilitres of air was made.

X-ray examination showed that the right lateral ventricle was slightly enlarged, and that both lateral ventricles were in normal position. The existence of an abscess of any size was thus excluded. The ventricular fluid contained 1,780 leucocytes and 440 lymphocytes per cubic millimetre. Culture produced a growth of *Staphylococcus aureus*.

A brain cannula was left in the ventricle and carefully fixed by firm dressings. Penicillin, 50,000 units in five millilitres of saline solution, was injected into the lateral ventricle at operation, and a further 50,000 units were injected later in the day.

On the following day the patient's temperature had dropped to normal for the first time. The brain needle was removed. He remained very irritable. On the thirty-first day, lumbar puncture produced turbid fluid, under a pressure of 140 millimetres, and containing 1,930 leucocytes and 350 lymphocytes per cubic millimetre; the protein content was 470 milligrammes *per centum*. Attempts to grow microorganisms from the fluid produced no result. The penicillin content of the cerebro-spinal fluid was tested. A

culture of *Staphylococcus aureus* was mixed with cerebro-spinal fluid and culture was attempted; the penicillin content of the cerebro-spinal fluid did not inhibit the growth of *Staphylococcus aureus*, and this fact indicated a low concentration.

On the thirty-second day, the patient complained of severe headache; he was most irritable and had pronounced neck rigidity and a tense *hernia cerebri*. Ventricular puncture was carried out and immediately relieved the intense headache. Penicillin, 100,000 units in five millilitres of saline solution, was injected into the right lateral ventricle, and a brain needle was left *in situ*. The ventricular fluid contained 160 leucocytes, 38 neutrophile cells and 94 lymphocytes per cubic millimetre. Culture produced a scanty growth of *Staphylococcus aureus*.

On the thirty-third day his general condition had improved and the neck rigidity was less pronounced. Penicillin, 50,000 units, was injected into the right lateral ventricle. The ventricular fluid contained 330 leucocytes, 32 neutrophile cells and 210 lymphocytes per cubic millimetre. Culture produced a profuse growth of *Staphylococcus aureus*.

On the thirty-fourth day the patient's condition was greatly improved. His temperature had fallen to normal, and the neck rigidity was much less. There was no discharge of cerebro-spinal fluid from the fistula on the following day, and his general condition was again better. The patient made remarkable progress until the fortieth day, when he complained of severe headache. The wound area was bulging and the fistula site was healed. Ventricular puncture completely relieved the headache. The fluid was under pressure and appeared slightly turbid. The ventricular fluid contained 310 leucocytes and 280 lymphocytes and large mononuclear cells per cubic millimetre; the protein content was 120 milligrammes *per centum*. The fluid was sterile. On the forty-second day the neck rigidity was completely absent, and the patient was allowed out of bed. From then on he made a complete recovery, except that the hemianopia persisted.

A summary of the findings on cerebro-spinal fluid examination and of the treatment is given in Table I.

Table I.

Day.	Lumbar Puncture Cerebro-Spinal Fluid; Leucocytes per Cubic Millimetre.	Ventricular Cerebro-Spinal Fluid; Cell Count per Cubic Millimetre.	Treatment.
24	1,180		Nil.
26	7,400		30,000 units of penicillin intrathecally.
27	7,000		100,000 units of penicillin intrathecally.
28		1,780 leucocytes; culture, *Staphylococcus aureus*.	Ventricular drainage and injection of 100,000 units of penicillin.
31, 32	1,930	160 leucocytes; culture, *Staphylococcus aureus*.	Ventricular drainage and injection of 100,000 units of penicillin.
33		300 leucocytes; culture, *Staphylococcus aureus*.	Ventricular drainage and injection of 50,000 units of penicillin.
40		310 leucocytes (lymphocytes and mononuclear cells, 280); fluid sterile.	Ventricular drainage.

Comment.

A case of staphylococcal ventriculitis is reported. The ventricular infection was probably secondary to a cerebro-spinal fluid fistula. The ventriculitis was treated by general penicillin therapy and by repeated ventricular drainage and instillation of penicillin. The patient made a rapid and complete recovery following commencement of ventricular puncture.

Acknowledgement.

We wish to thank the Director-General of Medical Services for permission to publish this case report.

A CASE OF DIABETES MELLITUS WITH HYPERLIPÆMIA AND HYPERCHOLESTEROLÆMIA.

By A. M. Henderson,
Captain, Australian Army Medical Corps.

Clinical Record.

Corporal W.F.K., aged twenty-three years, was admitted to hospital on September 1, 1944, complaining of headache, intermittent abdominal pain, drowsiness and heaviness of his limbs of two weeks' duration. He had vomited three times that day. He also said that he had had polyuria, polydipsia and "dizzy turns" for twelve months. He had been in New Guinea (Milne Bay) for nineteen months and had had three attacks of malaria, two of malignant tertian and one of benign tertian. He had had no other previous illnesses except measles as a child. There was no family history of diabetes.

When examined on admission to hospital, the patient was inclined to be drowsy, but he was mentally alert when addressed and had some hyperpnœa. He was extremely thin. His tongue was clean and moist; his systolic blood pressure was 110 millimetres of mercury and the diastolic pressure was 70 millimetres of mercury. His retinæ were pale and looked œdematous, and the retinal vessels were also pale. No other abnormal physical signs were found. On examination of the urine, it was found that albumin was present (about two-fifths), that sugar was present, a brick-red reaction being produced with Benedict's solution, and that Gerhardt's and Rothera's tests for acetone bodies gave strongly positive results. Blood taken for a blood sugar estimation was pale pink with paler—almost cream—streaks in it, and on microscopic examination it was found to contain extremely numerous fat globules. He was given twenty units of insulin and fluids while awaiting the report on the blood sugar estimation; but he vomited again (a large quantity of material), his pulse was softer and his air hunger increased, and a continuous intravenous infusion of normal saline solution was commenced.

At this stage the blood sugar content was found to be 300 milligrammes *per centum*, the blood urea level was 25 milligrammes *per centum* and the cholesterol content of the blood was 2,000 milligrammes *per centum*. His temperature was elevated (100° F.). The leucocytes numbered 22,000 per cubic millimetre. Examination of a blood film for malaria parasites gave negative results. The temperature returned to normal the next day and remained normal, and the number of leucocytes fell to 9,000 per cubic millimetre. For the next eight hours he was given forty units of insulin intravenously at intervals of two hours. At the end of this time he was still drowsy, but was easily roused, and he still had considerable air hunger. He was not vomiting. The results of urine tests were the same, except that only a cloud of albumin was present. He was then given forty units of insulin intravenously at intervals of approximately one hour for the next fifteen hours. After the first four intravenous doses of insulin, the blood sugar content was 195 milligrammes *per centum*, the blood cholesterol content was 2,800 milligrammes *per centum*, and the total fat content in the blood was 36 grammes *per centum*.

Blood sugar estimations were made every two hours for the next ten hours, and the blood sugar level rose steadily from 195 to 395 milligrammes *per centum*. The patient had lost his air hunger and he was taking fluids well without vomiting, and the intravenous administration of saline solution was discontinued after three litres had been given. However, in view of the rising blood sugar level, the dose of insulin was increased to sixty units subcutaneously every hour approximately for three doses, and then reduced again to forty units every hour.

The following morning (third day) he seemed very well; he was taking food and fluids, and he was given a diet of 1,500 Calories. Examination of the urine revealed no albumin or acetone, and the reaction to Benedict's solution was yellow. The blood sugar content was estimated at

9 a.m. and at 5 p.m., and on both occasions it was 115 milligrammes *per centum*.

From that stage onwards he was given insulin according to requirements, and his condition was fairly easily stabilized on thirty units of ordinary insulin and ten units of protamine zinc insulin per day before breakfast, and a diet of 2,200 Calories. At the end of two months his weight had increased from eight stone eleven pounds to nine stone four and a half pounds. The total fat and the cholesterol contents of the blood gradually returned to normal. This progress is shown in the graphs (Figures I, II and III).

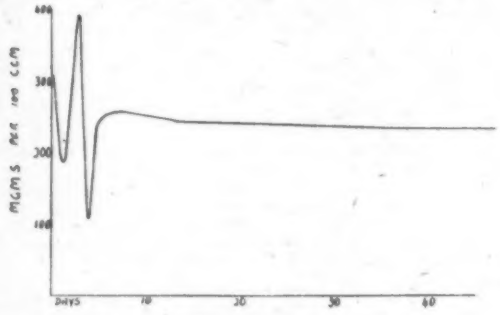

Figure I.
Blood sugar content.

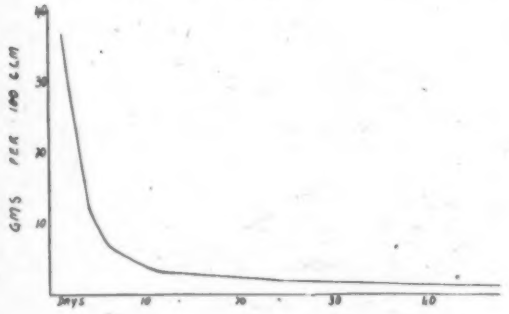

Figure II.
Total fat content of the blood.

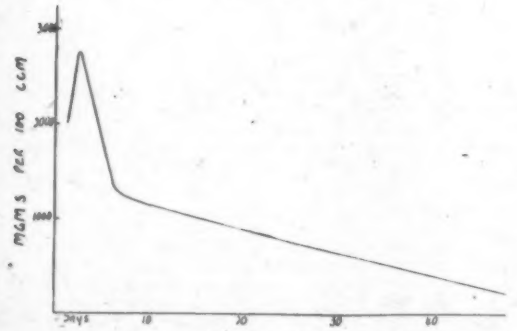

Figure III.
Blood cholesterol content.

On October 25, 1944, the fasting blood sugar content was 230 milligrammes *per centum*, the total fat in the blood was 950 milligrammes *per centum*, and the blood cholesterol content was 156 milligrammes *per centum*. The optic fundi were normal. An X-ray examination of his chest revealed old calcified foci at the apices of both lungs, but no other lesion. He was discharged from hospital on December 15, 1944.

It was noticed that at first his urine gave a yellow to orange reaction to Benedict's solution after breakfast, although he was given up to forty units of ordinary insulin half an hour before the meal, but that the urine became sugar-free about midday and remained so for the rest of the twenty-four hours, except for a small amount after the evening meal. However, after about six weeks, thirty units of ordinary insulin before breakfast were sufficient to render the urine sugar-free after this meal. This seemed to indicate some delay in insulin absorption during the early weeks of treatment.

Comment.

The interesting features in this case are as follows.

1. The extreme degree of hyperlipæmia and hypercholesterolæmia, which was apparently associated solely with the diabetic condition, as no other cause or contributing cause could be found, and as the blood fat and cholesterol contents returned to normal when the patient's condition was stabilized. No explanation for this very high figure was found, except that apparently the disease developed so slowly that these figures were reached before coma occurred.

2. The delay in response of the blood sugar to insulin. Even after 500 units had been given in twenty-four hours, the blood sugar content was still rising, although the patient's general condition had improved. He had no air hunger or vomiting, and ketosis had diminished.

3. The delay in absorption or utilization of the morning injection of insulin during the first few weeks. As the chemical composition of the blood became normal, the response to insulin became normal, and protamine zinc insulin had to be added to keep the urine sugar-free for the rest of the day.

No explanation could be found for the second and third observations, except that they were noted at the time when the total fat and cholesterol contents of the blood were at abnormally high figures.

Acknowledgements.

I wish to thank the Director-General of Medical Services for permission to publish this report, and Lieutenant-Colonel Lorimer Dods for the interest he took in the case.

A CASE OF LUDWIG'S ANGINA.

By Volney Bulteau,
Major, Australian Army Medical Corps.

The severity of infective processes in the floor of the mouth is a well-established fact; the profound degree of toxæmia and the alarmingly rapid train of obstructive phenomena both provide ample evidence of the fulminating nature of the so-called submaxillary woody phlegmon. The origin in most cases is said to be dental, and the causal organism to be a streptococcus. That the initiating lesion may be more recondite and the causal organism otherwise, is apparent from the following clinical note.

Clinical Record.

Lance-Corporal A.J.N., a soldier and amateur wrestler, aged twenty-two years and fifteen stone in weight, entered an army hospital in British north-west Borneo on September 2, 1945. He complained of pain in the left ear, present for the past two days—his ear felt blocked. There was a past history of a similar attack in New Guinea four months previously.

On examination, *otitis externa* of moderate degree was found to be present. Treatment with wicks impregnated with Burow's solution was instituted, and by the morning of September 4, the inflammation had considerably subsided. Early discharge from hospital was contemplated.

At 10 p.m. on the same day, the patient complained of a slight soreness in the throat. Examination at this time revealed that the buccal mucous membrane was moderately hyperæmic, but the tonsils appeared innocent. Immediately posterior to the left angle of the mandible there was a tender lymph gland about the size of a marble. When the patient was next examined at 9 o'clock next morning, a pronounced change in the general picture had taken place. Here was a patient manifesting the signs of general toxæmia; swallowing was impossible and speech was grossly distorted. Examination then revealed that the cervical adenitis had much increased; brawny œdema extended from the angle of the mandible to within one inch of the mid-line. The left glosso-gingival sulcus was occupied by similar œdema, and the left side of the tongue was pushed upward to the roof of the mouth. Intramuscular therapy with penicillin was immediately started. Within a few hours the march of symptoms and signs proceeded to the stage where respiratory embarrassment was present and toxæmia extreme. The patient was prepared for immediate operation.

The first stage of the operative procedure involved the performance of tracheotomy under local anæsthesia. The second stage was performed under intravenous anæsthesia with "Pentothal Sodium", combined with the continuous administration of oxygen. Through an incision extending from the level of the third molar tooth to the mid-line, at a distance of one inch from, and parallel with, the ramus of the mandible, the mylohyoid muscle was exposed and cut across, and sinus forceps were inserted into the most fluctuant part of the subjacent cellulitic area. Thick yellow-green pus was evacuated. The submaxillary gland was found to be woody-hard; insertion of sinus forceps failed to produce any pus. No counter-incision into the buccal mucous membrane was made. One rubber drainage tube was inserted up to the level of the mucous membrane and sutured in place. The wound was left widely open and packed lightly with "Vaseline" gauze.

For the succeeding six days, the pyrexia varied intermittently between 100° and 103° F. and the general toxæmia continued to be intense; but the relief from obstructive symptoms was greatly appreciated. Penicillin was continued, dosage consisting of a "spilling-over" dose of 100,000 units in the evening and 30,000 units three hourly throughout the day, starting at 6 a.m. Culture of the discharge obtained from the wound at the initial incision yielded a pure growth of pneumococci. Six days after operation the discharge from the wound was profuse and the œdema more fluctuant. As there was no evidence of respiratory embarrassment by the seventh post-operative day, the tracheotomy cannula was removed. From then on progressive subsidence of all signs and symptoms took place, and the drainage tube was removed on the eleventh post-operative day.

Dental examination both before and after operation revealed no dental cause. Furthermore, the tonsils were not involved throughout the course of the illness. In fact, the origin of the infection remained obscure until twenty days after operation when the patient, noticing a certain roughness under the tongue, himself delivered a hard calculus, approximately three-eighths of an inch in diameter, from the region of the orifice of the submaxillary duct. X-ray examination of the region of the submaxillary gland failed to reveal the presence of any further calculi.

Further convalescence was uneventful, and the submandibular wound had healed by October 9, 1945. The sole residual manifestation was persistent hardness of the submaxillary gland, which was secreting but a scanty flow of saliva.

Comment.

The following considerations seem worthy of comment:

1. The latent submaxillary duct obstruction, apparently acting as the factor predisposing to the infection.

2. The pneumococcus as the causal organism.

3. The minimizing of anæsthetic hazards by the performance of the operation in two stages, as outlined above.

There is perhaps one more thing to mention: I doubt whether this soldier would be alive today, had it not been for the aid of penicillin.

Acknowledgement.

The Director-General of Medical Services has given permission for the publication of this paper.

Reviews.

THE BACTERIAL CELL.

"The Bacterial Cell" is a most important book.[1] In 1944, Professor René J. Dubos, whose work is followed with interest and respect as each phase of it is published, delivered a series of lectures in Boston, under the auspices of the Lowell Institute. From them grew this book, which correlates admirably all aspects of modern research bearing upon its purpose, which is stated thus: "The ultimate understanding of the natural history of infectious diseases, and the rational development of methods for their control, depend upon the knowledge . . . of those molecular groupings which on account of their chemical activity, condition the cell both as an independent functioning unit and in its relation to its environment."

The nine chapters lead through a consideration of cytology and physico-chemical properties of cells to biochemical and biological analysis of cellular structure and physiological variations, thence to the property of virulence, and finally to the use of this knowledge for immunization against infections, and the antibacterial agents in the treatment of disease.

The chapter on cytology deals with the accumulating evidence for the existence of nuclear material in the bacterium, and should be read in conjunction with the addendum by C. F. Robinow, which is beautifully illustrated with electron microscope photographs of various points made in the text. This is indeed an invaluable method of study of problems of minute structure and bacterial movement.

The analysis of theories and evidence in relation to the Gram stain includes explanation based on the behaviour of particles in an electric field and the uptake of ions by bacteria in solutions of varying pH. The iso-electric point of bacteria, at which they retain equal amounts of anion and cation, determines their affinity for acid or basic dye, in other words, their Gram reaction; if this point is around pH 2·0, they are Gram-positive, if around pH 5·0, they are Gram-negative.

Surface phenomena and cellular permeability also play a part in staining reactions, and the importance of the morphological integrity of the cell wall is shown by changes after bile salt treatment, and by the difficulty in influencing the staining affinity of mycobacteria which possess large amounts of lipid in the cell body.

The relation of the capsule to the biological activity of the organism is the author's own field, and he points out that the specific enzyme reaction is an extremely delicate one in its demonstration of the nature of the capsular polysaccharide, and of particular importance in the analysis of cell activities. Changes in enzyme production constitute a large part of the variability of bacteria, adaptive enzymes in response to a particular substance present in their environment being especially significant in relation to the sulphonamide series. The author stresses the view that natural selection is a powerful factor in populations where wide variations are known to exist, and while variation of linked characters is possible, they are not necessarily associated. The recent transmutation of pneumococcal types is an achievement, because the transforming substance is pure, and a great deal is known of the conditions necessary to produce it.

In the discussion of antibodies and antigens, the toxin of which we have most information, namely, diphtheria toxin, is discussed; in relation to bacterial antibodies we are reminded that the familiar agglutination and precipitation phenomena seldom occur *in vivo*, and that the production of antibodies does not protect against infection. Phagocytosis is the process of greatest importance in the living host, and while certain inhibiting factors are known, the participation

[1] "The Bacterial Cell: In its Relation to Problems of Virulence, Immunity and Chemotherapy", by René J. Dubos, with an addendum by C. F. Robinow, Cambridge. Massachusetts: Harvard University Press. 8½" × 5½", pp. 480. Price: $5.00.

of the tissue cells and fluids is little understood. The chapter on bacteriostatic and bactericidal agents is brilliant, correlating as it does physical and chemical aspects with biological effects. "Drug fastness" is a condition the danger of which is imperfectly recognized by the clinician, and the two factors of natural selection of resistant strains and changed cellular metabolism probably both operate to produce an organism whose enzymatic equipment ignores the particular agent with which it is confronted.

Dubos concludes with a philosophic reflection on the prospects of the future, and finds comfort in the fact that so much remains constant in a bacterial world which is capable of so much change—"The extraordinary plasticity of bacteria . . . has not only determined their importance in the economy of nature, it also makes them ideal objects for the study of that organization and integration of independent characters which define and characterize life."

NUTRITION AND DIETETICS.

LEST possible purchasers be put off by the title, it should at once be pointed out that Lucius Nicholls's "Tropical Nutrition and Dietetics"[1] is actually a first-class book on general nutrition and dietetics, with special attention paid to tropical problems. This is the second edition. It is twice the size of the first, which appeared in 1938, yet there is nothing superfluous, and certainly no padding, anywhere between its covers. The opening chapter deals, inevitably, with carbohydrates, fats and proteins, yet so concise and practical is the handling that even these time-worn subjects become interesting and entertaining.

The chapters on vitamins comprise a most comprehensive and up-to-date discussion. The very latest theories are offered, but the reader is left in no doubt as to what is certain and what theoretical—indeed, this applies throughout the book; the full experimental basis is given for every statement made. The author holds that the vitamins should be given their chemical names and that their quantities should be stated in actual weights. By the time one has read through the lists of the various "units" which have been in use from time to time, one is very ready to agree with him.

The lists of food analyses, both those giving vitamin content and those giving essential constituents, are exceedingly well prepared and set out, and cover all normal dietary possibilities for all climates. The sample diets are sensibly worked out on a practical basis suited to the economic capacities of the people concerned. There are three chapters devoted to a general discussion of individual foodstuffs, and one on poisonous forms of foods, which are truly admirable. Altogether, this book can be recommended to all who are interested in dietetics, everywhere, although, of course, tropical considerations are high-lighted. All aspects of the subject are adequately and scientifically presented, and there are plenty of references quoted. The pity of it is that the writing is so careless. A critical survey of the first hundred pages reveals twenty-seven errors in syntax or spelling, and eight obvious misprints. In addition, the eccentricities of the punctuation are most confusing—not only are badly needed commas and hyphens omitted, but commas are habitually left to do the work of semicolons and periods, with disastrous effects on the syntax. This sort of thing makes reading difficult. It is a pity that a book of such outstanding material excellence should be so marred. However, this criticism does not alter the fact that this is a very valuable book.

OPERATIVE SURGERY FOR NURSES.

NURSES, especially those aspiring to be good theatre sisters, have always desired to share in the surgeon's knowledge of anatomy and surgical technique. Hamilton Bailey, in "Demonstrations of Operative Surgery for Nurses",[2] has helped to supply their need in an instructive and interesting way. This book can be recommended to all trainees and to those who have the education of nurses in their care. Medical students in their early clinical years would benefit by reading it.

The book is amply illustrated, as one might have expected. This increases its value, even though some of the illustrations are unnecessary. One wonders if the nurse in Figure 32 has been teased by her friends for not having the mask over her nose. The "collar" incision in Figure 353 turns up at each end. This is a common error on the part of surgeons. Figure 229 is useless.

Clarity has been increased by describing only one method of performing each operation. At least a hint should have been given in some instances that there were other ways. Thorek's method of performing cholecystectomy has not become the standard method and should not have been described as such. Several objections concerning minor matters could be raised. Atraumatic needles are very nice for bowel work, but they are not always available. Straight, round-bodied needles should therefore find a place in an abdominal set. It is not clear how a method of draining a breast abscess with an open drainage tube can be called a "closed" method. It seems unnecessary to have described forequarter amputation in such a book as this. Finally the reader might have been told that one of the purposes of the use of the anal tube after hæmorrhoidectomy was to prevent "concealed" hæmorrhage into the rectum.

Despite these minor criticisms it is certain that the book will win a deserved popularity among nurses, even though many operations are described from the point of view of the surgeon and not of the nurse.

Notes on Books, Current Journals and New Appliances.

THE FIGHTING IN NEW GUINEA.

IT is unfortunate that Osmar White's "Green Armour" should appear just after the end of the Pacific war when the public interest in the operations in that area has decreased.[1] For it is a clear, impersonal account of the earliest days of New Guinea fighting and the first phase of the offensive against Japan at Guadalcanal and New Georgia. Mr. White is at some pains to correct some popular ideas on the subject, and for that reason, if not for any others, it will be a pity if the book is not widely read. For instance, there is the mistaken conviction held here that the Japanese advance was first stopped by Australian troops about thirty miles from Port Moresby, whereas, in reality, the advance, by then reduced to a small patrol, petered out at that point from exhaustion and lack of supplies.

He tells a vivid story of the fighting in New Guinea, and pays great tribute to the guerrilla patrols and the "eerie sneaking war" they waged against the enemy when for five months they immobilized two Japanese divisions. His descriptions of the troops in battle are as objective and unsentimental as the men themselves.

The second half of the book is about the American push in New Georgia, where their success was based on the lessons so bitterly learned at Buna, Gona and Sanananda.

Mr. White has looked at the beauty and horror of the New Guinea jungle and landscape with a keen and observant eye and makes clear the point that the greatest fight and victory was that against nature, the "Green Armour" of New Guinea.

ARTIFICIAL RESPIRATION.

DR. F. C. EVE, of Hull, has published a booklet, "Artificial Respiration Explained", which should be of use to the intelligent layman.[2] He reviews the Schafer method, the Silvester method and the rocking method. He thinks that the Schafer single-handed method should be taught to all first-aiders, but thinks that the more intelligent should be instructed in other methods available for two or more operators. The subject is important; that knowledge about it is needed is shown by the fact that nearly 3,000 lives are lost every year in Great Britain from drowning alone. The booklet is well printed and the illustrations are first rate.

[1] "Tropical Nutrition and Dietetics", by Lucius Nicholls, M.D., B.C., B.A. (Cantab.); Second Edition; 1945. London: Baillière, Tindall and Cox. 8½" × 5½", pp. 382, with illustrations. Price: 27s. 6d.

[2] "Demonstrations of Operative Surgery for Nurses", by Hamilton Bailey, F.R.C.S.; 1945. Edinburgh: E. and S. Livingstone Limited. 8½" × 5½", pp. 356, with many illustrations, some of them in colour. Price: 21s., postage 7d.

[1] "Green Armour", by Osmar White; 1945. Sydney, London: Angus and Robertson, Limited. 8¼" × 5½", pp. 256. Price: 10s. 6d.

[2] "Artificial Respiration Explained", by Frank C. Eve, M.D. (Cambridge), F.R.C.P. (London); 1946. Edinburgh: E. and S. Livingstone Limited. 7¼" × 5", pp. 80, with many illustrations. Price: 3s. net, postage 3d.

The Medical Journal of Australia

SATURDAY, APRIL 13, 1946.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE NATIONAL HEALTH SERVICE BILL OF GREAT BRITAIN.

In this issue of the journal we publish the text of the White Paper issued from His Majesty's Stationery Office on March 21, 1946. It is understood that a copy of the White Paper has been sent to every member of the Association, and presumably Australian members will be included. Several weeks, however, must elapse before copies can reach Australia by ordinary surface mail. The matter is one which concerns every member at home and abroad. Australian members know that they are likely at the instance of the Commonwealth Government to be faced with much the same sort of problem as faces the profession in Great Britain. They are therefore urged to study the White Paper carefully and to become familiar with its main features. It will be noted that three main services are contemplated. The general practitioner service comprises health centres and a family doctor service. Medical practitioners may choose whether they wish to join the service, and if they do join it they will not be debarred from receiving fees from patients who do not wish to avail themselves of the provisions of the service. The service will be available to every member of the community, regardless of his financial status. The second of the three services is concerned with hospitals and consultants. All forms of hospital treatment are to be included, both in-patient and out-patient, and the advice of specialists will be available at hospitals, at health centres and in the patient's home. The hospitals will be taken over by the Minister and regional boards will be created. In last week's issue this subject was mentioned and we published a statement by the British Hospitals Association with certain proposals advanced by it. The third services are the local government services and comprise midwifery, child welfare, health visiting and home nursing, ambulance services and the provision of domestic help in certain circumstances.

The Council of the Parent Body has drawn up a report which is being circulated to every member of the Association together with the White Paper. This report consists of two parts. In the first part are enumerated the principles of the profession which were published in the *British Medical Journal* of December 15, 1945. These principles were drawn up by the Negotiating Committee, a body composed of representatives of the British Medical Association, the Royal College of Physicians of London, the Royal College of Surgeons of England, the Royal College of Obstetricians and Gynæcologists, the Royal Scottish Medical Corporations, the Society of Medical Officers of Health and the Medical Women's Federation. The second part of the report is a document which has been drawn up by the Council of the British Medical Association. It is a report on the Bill and will be submitted to a special representative meeting at London on May 1 and 2, 1946. In view of the importance of this document it is reproduced in full hereunder.

The Council, having considered the Government's proposals, recommends to the Representative Body:

That the following statement of policy on the Government's Bill for a National Health Service be approved:

1. The profession, while anxious and willing to cooperate with the Government in evolving a complete health service, is opposed, on grounds of public interest, to certain important features of the Government's proposals.

Organization.

2. In the Bill it is proposed that the Minister should assume general responsibility for the service and discharge this responsibility through three main channels. In the case of hospital and specialist services he will delegate the bulk of the administration to new regional and local bodies. He will place the responsibility for domiciliary clinic and health centre services directly on local health authorities (county and county borough councils). He will place the responsibility for general practitioner services on specially appointed local bodies acting within national regulations made by himself.

3. Will this proposed structure secure what the profession has long been seeking—the proper coordination and correlation of the country's medical services? Will the individual citizen be well served by the proposed administration? When he seeks attention from his family doctor he will be availing himself of a service administered by the local executive council. If that service is rendered in a health centre he will receive it in premises owned by another local body, the local health authority. If his doctor recommends him for hospital treatment he will pass to yet another administration, that of the regional body.

4. In the case of an expectant mother, she may receive her medical care from her family doctor at home or in the consulting room, although the proposals on this point are not clear. She may attend an ante-natal clinic, part of the local health authority's service, receiving it there from a whole-time local authority medical officer. But if she proposes to be confined in hospital she may receive her ante-natal care at a parallel set of ante-natal clinics, this time administered by the regional body and staffed by hospital medical officers. If her confinement takes place at home she may be attended by a midwife appointed by the local authority, a doctor in the family doctor service, and if specialist help is sought, by a specialist in contract with the regional body.

5. In the case of infectious disease the responsibility for preventing its spread will be that of a local authority, probably a lesser local authority. If a case of infectious disease needing hospital treatment occurs, the patient will be conveyed to another service administered at the regional level.

6. There appears to be little immediate prospect of bringing to the general practitioner forms of work which should, in the interests of the patient, be undertaken by him. While the *ultimate* object may be to make unnecessary the provision of medical treatment by the school medical service, what is proposed at the outset and for an indefinite period is that such services shall be separately provided and organized by local education authorities, supervised by the Ministry of Education. No attempt is made to bring together the general practitioner service now rendered to mothers and children in clinics and the main general practitioner

service, other than the suggestion that immunization, together with vaccination, should be carried out by general practitioners. To employ general practitioners in clinics is not enough. Much of the work now done in clinics should be undertaken by general practitioners as part of their normal work for those under their care. Child welfare responsibility is to follow educational responsibility, which in many cases will mean that a further authority is involved in health administration, a local authority which is not a county or county borough council.

7. The Association criticizes the proposed administrative arrangements as likely to divide the service into at least three compartments, to perpetuate or create barriers between general practitioner and hospital, between hospital and health centre, between the family doctor service and the local authority clinic services, between local authority medical officers and hospital staffs and general practitioners, as well as between the bodies employing them.

8. The Minister will provide and manage a public health pathological laboratory service for the control of infectious diseases, but local authorities are still to be free to provide their own laboratory services. No mention is made of the clinical pathological services unless these are to be regarded as part of the specialist service coming under regional administration.

9. At what level can coordination best be secured? It is not enough to state, as the Minister stated in reply to questions from the Negotiating Committee, that coordination between general practitioner and hospital services can be secured by the policy of administration of the Minister, by the work of the Minister's officers, by the presence of some general practitioner members on regional boards and local management committees; that general practitioners will be responsible for the care of their own patients in general practitioner hospitals, which do not yet exist; that the general practitioner will consult freely with the specialist at the hospital, or work as a clinical assistant, or join his local medical society. There will be only such coordination as the administration makes possible.

10. In the Association's considered view, coordination should take place at the regional level. Regional boards should assume responsibility for the planning and administration of hospital and non-hospital medical services alike, for the building, ownership and administration of such health centres as may be developed, for the clinic and other treatment services of local authorities; in short, for all treatment as distinct from environmental services. Responsibility for a completely coordinated maternity service, including domiciliary midwifery, for health visiting and home nursing services should rest with the regional body. It is recognized that effective local administration may require that regional boards delegate some of their responsibility to appropriately constituted local or area bodies responsible to them, just as it is proposed to delegate responsibility for individual hospitals to local hospital management committees. The statutory responsibility for the provision of these services should be placed not upon local health authorities, but on regional bodies.

11. This proposal raises two problems. There would continue to be a divorce between environmental and treatment services. While this would be disadvantageous, it would be a great improvement on the Minister's present proposals. If the regional principle be accepted, there arises the question of what would happen to the local executive council. The Association approves the functions and composition of the local executive council, but to secure coordinated administration is of the opinion that it should operate on a regional basis.

12. The Association's view on this part of the Bill may be summarized by stating that effective functional integration can be secured only by concentrating local responsibility, administrative, financial and other at one level, and in the Association's view the appropriate level is the one selected for hospital services, the regional level. This regional integration is essential not only to efficient administration, but in the interests of the public.

Central Advisory Machinery.

13. While the establishment of a Central Health Services Council drawing members from all the main health professions with a majority of medical members meets the profession's views, the Association urges the Minister to make certain changes. It wishes particularly to stress the following points:

(a) The Council will give the fullest satisfaction only if its medical members are regarded as fully representative of the medical profession. It is desirable in the public interest to make impossible the appointment of medical members who are unacceptable to the Minister or to the medical profession. For this reason the Association urges that the medical members should be appointed by the Minister in agreement with the medical profession, a nominee unacceptable to the Minister or the profession being rejected. In addition, there should be a small number of ex-officio members, e.g., the Presidents of the Royal Colleges and the Chairman of Council of the British Medical Association.

(b) The standing advisory committees of the Central Health Services Council, like the standing committees of other bodies, should report through the parent body, reporting to the Minister direct only in circumstances approved by that body, or in an emergency by its Chairman. The Central Health Services Council should itself appoint its committees, standing and other, and determine their terms of reference. Only in this way will the Central Health Services Council become a really effective body.

Hospital and Specialist Services.

14. The Association joins with the Government in desiring a coordinated hospital service regionally administered over natural hospital areas, a policy which it has consistently urged in all previous discussions. It is impossible to judge the merits of the proposed hospital administration in the absence of detailed information on the composition of regional hospital boards and local hospital management committees. If such bodies are appropriately constituted, with adequate representation of the medical profession, of experts in the voluntary hospital field and, in the case of the regional boards, of the universities, the proposals may, from the administrative point of view, conform to the profession's repeatedly expressed desires. If, on the other hand, the representatives of local health authorities are to be placed in a majority on regional hospital boards or local hospital management committees, the proposals will be in direct conflict with the views of the profession. The Government is urged to embody proposals for the composition of these bodies, and of the boards of governors of teaching hospitals, in the Bill, and not to leave them to be dealt with subsequently by regulation.

15. The method of the group management committee, common in local authority organization, does not do away with the need for an individual committee of management. Accordingly, the Association urges the establishment for each hospital of a committee of management, to be responsible for its day-to-day administration in conformity with the plan of the regional hospital board, and a medical staff committee in close relation to, and represented upon, the committee of management.

16. On the subject of ownership, the Association recognizes that the Government's proposals raise serious issues which will be the concern of the public as a whole. The adoption of these proposals as they stand will inevitably involve a loss of local personal interest, and the discouragement of local support, whether in the form of contributions or of service. At present the local hospital, whether voluntary or council, commands a great deal of local pride, resource and initiative, amounting sometimes to individual sacrifice for the community's good. Somehow or other these things must be preserved. These arguments for the preservation of the individual character and the local relationships of hospitals are not mere sentimentality. They bear closely, for example, on the hospital's capacity for innovation and experiment, its power to attract nursing and other staff and the confidence of the local people in their local hospital.

The Association has consistently pressed for an effective and appropriately constituted regional body with sufficient powers, financial and other, to secure the planned development of hospital services. In the Association's view, the Minister should accept responsibility for all hospital provision and maintenance, voluntary and council, being advised on the allocation of the necessary centrally provided moneys by regional bodies. Such an arrangement would secure to the Minister and to the regional body all necessary power in the organization and development of the hospital service of its area, and it is unnecessary and undesirable for the Minister to proceed to assume actual ownership of hospitals, council or voluntary.

17. The Government's proposals might threaten private consulting practice, despite the fact that the proposal of part-time service for some consultants is based on the assumption that private practice will be facilitated. The State, as owner of the hospitals, will control the private or semi-private accommodation, and so will be free to convert private accommodation to semi-private accommodation and either to public accommodation when it so desires. In this way, and by its control of fees charged in private accommodation, it will control private consulting practice in

so far as it is conducted in hospital premises. There will be scope for people to obtain additional amenities, e.g., private rooms where these are not medically necessary, by payment of the extra cost involved. But it appears that private accommodation will be restricted to particular hospitals where provision can be made "in separate parts of the hospital", and that the facilities will be limited to specialists taking part in the new service. This provision should not exclude the recognition of rooms and beds in the main hospital buildings as private accommodation. The Association is opposed to a restriction of the use of private accommodation of a particular hospital to specialists taking part in the new service.

In the public interest the conditions imposed should not be such as would lead or compel consultants or their patients to use nursing home or similar accommodation dissociated from the hospitals for private consultation and treatment.

Teaching Hospitals.

18. The proposals for the administration of teaching hospitals can be judged only when fuller information as to the composition of the proposed boards of governors is known. It is not clear to what extent hospitals affording post-graduate clinical teaching and research will be regarded as teaching hospitals for the purpose of these arrangements. It is not clear what part the University Grants Committee will play in financing teaching hospitals. Only when fuller information is available can the proposals in relation to teaching hospitals be judged.

LOCAL CLINIC, DOMICILIARY AND WELFARE SERVICES.

19. The proposals under this heading have been the subject of comment in earlier paragraphs. The Association dislikes the proposals to place a statutory duty on local health authorities in respect of school medical and maternity and child welfare services, domiciliary midwifery, health visiting and home nursing services, vaccination and immunization, and a general ambulance service. Similarly, the Association is opposed to the proposal to place the responsibility for the provision and maintenance of health centres, dental centres and similar premises upon the local health authority. The health centre no less than the hospital should be the responsibility of the regional board. In the case of the ambulance service the case for regional organization is no less strong, for this, the committee believes, is the only way of bringing to an end the irritating limitations imposed by local authorities on the use of their ambulances outside their areas. These services should, in the Association's view, be administered, together with the hospital service, at the regional level.

FAMILY PRACTITIONER SERVICES.

20. An objective from the outset will be the development of the health centre system. The profession is deeply interested in health centres—indeed, the general idea was first put forward by the profession itself. But it would be contrary to the public interest to proceed to a rigid health centre policy without widespread experiment into the merits and demerits of different types of health centre in different types of area. The Association suggests an immediate experimental investigation, under medical guidance, of health centres of varied types and functions. Some advantages, such as the organization of nursing and clerical facilities, the provision of premises specially built for the purpose, are obvious. Some disadvantages, particularly from the point of view of the public, are no less obvious. For example, patients will travel greater distances, they will suffer some loss of privacy, there may well be a loss of the personal touch. No details are given of the kind of health centre it is proposed to develop. The health centre outlined in the Coalition White Paper can be fairly described as an aggregation of doctors' consulting and waiting rooms, with common nursing and clerical help. This does not meet the real need. What general practitioners need, above all, is the provision of facilities for fuller diagnosis, with special emphasis on pathology and radiology. The extent to which such facilities can be made available in health centres should be a matter of widespread experimentation before the lines of central policy are laid down.

21. The building of health centres will take a considerable time. Pending their construction the effect of the Government's proposals will be not what it seeks, the encouragement of group medicine, but the opposite. The abolition of goodwill will of itself destroy the present basis of partnership agreements, breaking up partnerships into units of individual practitioners who may or may not reach arrangement between themselves. This may be still the case when health centres are in action. Further, no indication is given that the Government contemplates, in its proposed arrangements, the status of "assistant". It appears that all general practitioners in the proposed service, whatever their age or experience, will practise as individuals.

22. If the duty to provide and maintain health centres is vested in local health authorities, it will be difficult to avoid the present limitations of local facilities to the residents of particular local government areas. It is doubtful whether a health centre provided and maintained by one local authority would be available to the residents in an adjacent local authority area. This would involve some restriction of the patient's free choice of doctor. As has been urged in an earlier paragraph, the ownership and administration of health centres should be vested in the regional body.

23. The following statement was made by the Minister of Health in the House of Commons on Thursday, December 6, 1945:

> 1. The Government have not yet finally decided upon the proposals which they will be submitting to Parliament for a National Health Service.
>
> 2. They believe, however, that it will be incompatible with the provision of an efficient service that the future exchange of medical practices and the creation of new practices within that service should be left entirely unregulated, and that no effective steps should be taken to secure a proper distribution of doctors to fit the public need.
>
> 3. I appreciate that intervention in this field, in whatever form it may take, will probably have the effect of preventing the sale and purchase of the practices of doctors taking part in the new service, and the Government therefore think it right to give warning of this probability at once and in advance of the formulation of their full proposals.
>
> 4. At the same time and in order to allay the natural anxieties of doctors already in practice, or coming into practice from the Forces or elsewhere, the Government wish to make it clear that there will be an appropriate measure of compensation to doctors in respect of loss of capital values directly caused by the new arrangements.
>
> It is intended that discussions should be undertaken immediately with the profession's representatives with regard to the steps to be taken to give effect to this decision.

24. The Government proposes to control the distribution of doctors and recognizes that such control will destroy the selling value of practices wholly or partly in the public service. The method of control will be to require new entrants to the public service to apply to the local executive council, which will pass the application on to the Central Committee on the Distribution of Medical Practices, the decision as to whether the applicant is to be allowed to practise in a particular area being made by the latter body.

A central point of government policy is the decision to achieve a better distribution of general practitioners by *control*. In the view of the profession such control is unnecessary and undesirable. An examination of the figures of the distribution of doctors in relation to population before the war shows, admittedly, an irregularity of distribution and some under-doctored areas. Generally speaking, these areas are not local government areas; usually they are pockets and not complete towns or counties. But it must not be thought that such irregularity merely exhibits a preference on the part of doctors for wealthier areas. For example, the ratio of general practitioners to population shows that Barrow-in-Furness, Darlington and Macclesfield were in the years before the war provided with more doctors per thousand of population than Richmond, Rugby or Winchester. When the age and health record of the local doctors has been examined, as it has been by the Central Medical War Committee during the war, it has been commonly shown that apparently over-doctored areas are, in fact, no better served in terms of medical manpower than apparently less well-doctored areas.

25. The introduction of National Health Insurance was briskly followed by a more even distribution of doctors. The introduction of a scheme available to the whole community will of itself exercise a very considerable influence in evening out medical distribution. The main problem which, in the Association's view, will remain unsolved by the introduction of a 100 per cent. service is the problem of the sparsely populated rural area. The method of extra inducement can and should be applied to solve the problem of the sparsely populated area, as it can be applied—if experience shows it to be necessary—to other areas. In addition, the

Minister could retain the powers given in Section 15 of the National Health Insurance Act, 1911 (and in Section 37 of the Act of 1936), enabling appropriate arrangements to be made in areas where medical service is inadequate. The profession will willingly establish an advisory machinery for helping to assist incomers to practice to select areas where the need is greatest. What it is opposed to as both unnecessary and undesirable is the form of negative direction proposed by the Government.

26. It was the Government's proposals for control which, because of their anticipated effect on the capital value of practices, led it to put forward proposals for compensation. Clearly there should be full compensation for any adverse effect on capital values occasioned by the Government's proposals. But, in the Association's view, the Government should not proceed with proposals to control the distribution of doctors if improved distribution can be secured without such control. If the "control" proposals are not proceeded with, it will be unnecessary to interfere with existing arrangements for the buying and selling of practices. The profession can and will make possible by its organization the entry or re-entry of demobilized practitioners to general practice under terms which are not onerous.

Clearly the proposal to abolish the buying and selling of practices is a crucial issue. Already the profession has expressed the view "that it is in the national interest and essential to the independence of the profession that doctors should continue to own the goodwill of their practices". The three proposals, (a) to abolish buying and selling, (b) to institute basic salaries, (c) to control the distribution of doctors, considered either separately or as related parts of the plan, would take the profession much nearer the whole-time, State-salaried service to which it is so strongly opposed.

27. It is understood that a substantial proportion of general practitioner remuneration will be derived from basic salary. The Association can find no justification for this proposal. It desires that the main, if not the only, element in general practitioner remuneration should be the choice of the individual doctor by the individual patient. The basic salary proposal, particularly if the proportion of the total remuneration is substantial, will lead to whole-time salaried service—something to which the profession is wholly opposed. It believes that in the future, as at present, there will need to be an appropriate proportion of assistants to principals in general practice, those assistants being employed by principals. It would be appropriate to establish agreed general salaries for assistants. It would be reasonable to require that a practitioner shall not become a principal in the new service until he had served for a prescribed period of time as an assistant. When he becomes a principal, his remuneration should be related to the number of patients on his list.

28. If the Government proposes to pay basic salary only when a certain minimum number of patients have chosen the doctor, its proposal is superfluous. If it proposes to pay a basic salary to a practitioner entering the public service, however small the number of patients who are on his list, then the proposal is extravagant.

AMOUNT OF COMPENSATION.

29. After discussion between the Ministry of Health and the Compensation Subcommittee of the Negotiating Committee, the following letter was sent to the Minister:

March 8, 1946.

Dear Mr. Bevan,

The Compensation Subcommittee of the Negotiating Committee has entered into discussions with the Ministry on the question of compensation, without accepting the policy from which the necessity for compensation arises. The medical profession is in no way committed to the policy of abolishing the custom of buying and selling goodwill. Indeed it has in the past expressed its opposition to this policy.

Important principles affecting the freedom of the medical profession are involved, and the amount of money offered by the Government in compensation is irrelevant. The Government's proposals must be considered as a whole and not merely in terms of finance.

The view of the subcommittee is that if the Government persists in this policy, and Parliament approves, then the sum of £66,000,000, which the Government, after negotiations with the subcommittee, now offers, may, on the evidence available, be taken to represent the aggregate capital loss involved in respect of the goodwill of general practices.

The Compensation Subcommittee understands that this sum of £66,000,000—

(a) is based on the Government's estimate that 17,900 principals will enter the National Health Service;
(b) will not be subject to increase if in fact more than 17,900 principals so enter;
(c) will be subject to reduction if the number of principals so entering is below 17,700; the reduction for each principal in defect of 17,700 to be 1/17,900 of £66,000,000.

Yours sincerely,

(*Signed*) CHARLES HILL,
Secretary.

The Right Hon. Aneurin Bevan, M.P.

SOME OTHER POINTS.

Civil Rights of Doctors.

30. It should be secured in the Bill that doctors who participate in the National Health Service are not disqualified to serve as Members of Parliament, as members of local authorities and of any bodies concerned with the administration of the service, including regional boards, local hospital management committees and local executive councils.

Industrial Medical Service.

31. The exclusion from the scheme of the industrial medical service cannot be justified. The medical supervision of the worker at the factory should be linked with the supervision of his home environment as part of the same health service. Medical services in industry are of comparatively recent growth, and the opportunity should not be lost of integrating them with the main health service.

Specialists in the Public Health Service.

32. While it is proposed to inaugurate selection committees for the appointment of specialists, there is nothing in the Government's proposals to indicate that senior specialist officers in the Public Health Service will be appointed otherwise than by local authorities.

Medical Research.

33. No new proposals are advanced for the expansion and development of medical research. The facilities and resources for medical research should be greatly increased.

THE PROPOSALS AND THE PRINCIPLES.

34. There are four of the profession's essential principles upon which the Government's proposals have a particular bearing:

Principle I.

The medical profession is, in the public interest, opposed to any form of service which leads directly or indirectly to the profession as a whole becoming full-time salaried servants of the State or local authorities.

35. The State will own all the hospitals in which consultants work, will appoint the governing bodies of hospitals, and, through regional boards, will employ the consultant to work in or from its premises, the consultant being employed on a whole-time or part-time basis. Whether the hospital proposals will lead directly or indirectly to consultants and specialists becoming "full-time salaried servants of the State or local authorities" will largely depend on the composition and functions of the regional board, the local hospital management committee, the board of governors of the teaching hospital, and the committee of management of the individual hospital.

36. General practitioners will be in contact with local authorities, half professional and half lay. At the earliest possible moment they will conduct their public general practices in premises owned and administered by a local authority. They will be remunerated in substantial part by salary. New entrants to public general practice will be appointed by a mainly medical body set up by the Government and working under its general direction. The Government's proposals, in the Council's view, will lead to general practitioners "becoming full-time salaried servants of the State or local authorities".

Principle IV.

Doctors should, like other workers, be free to choose the form, place and type of work they prefer without governmental or other direction.

37. For the reasons set out in earlier paragraphs the Government's proposals are in conflict with this principle.

Principle V.

Every registered medical practitioner should be entitled as a right to participate in the public service.

38. The Government's proposals violate this principle. They contain no provision whereby a medical practitioner could claim the right to take part in the service somewhere. The local executive councils will consider not only the need for a new practice or replacement, but also the suitability of the applicant. The applicant, although recognized and approved by the General Medical Council, might therefore find himself or herself excluded from the service, either in particular areas or in every area.

The present proposals, in the Association's view, should be replaced by provisions similar to Sections 35 (2) (*b*) and 36 of the National Health Insurance Act, 1936. Section 35 (2) (*b*) secures a right on the part of any medical practitioner who so desires of being included in the lists of medical practitioners who have agreed to attend and treat insured persons. Section 36 is as follows:

> If the Minister, after such inquiry as may be prescribed, is satisfied that the continued inclusion in the list of any medical practitioner would be prejudicial to the efficiency of the medical service of the insured, the Minister may remove his name from the list.

Principle VII.

There should be adequate representation of the medical profession on all administrative bodies associated with the new service in order that doctors may make their contribution to the efficiency of the service.

39. The profession is promised medical representation on central advisory bodies, on regional boards and on local hospital management committees. Although it is promised a majority on the Central Health Services Council, the composition of regional boards and local hospital management committees, as of boards of governors of teaching hospitals, is not known. Even though local health authorities are to be required to establish public health committees, there is not to be a requirement to co-opt doctors and other non-members of the authority with experience of the health services. Thus the Government's present proposals present some points of conflict with this principle.

The representative meeting on May 1 and 2 will be the occasion of discussions so vital to the future progress of medicine and to its value as a weapon in the prevention and cure of disease, that a representative from Australia familiar with the medico-political developments of the last few decades should attend. He would come back with impressions and information useful to the Australian Branches, and from his Australian experience he might be able to make useful contributions to the discussions.

Current Comment.

THE EYE SIGNS IN GRAVES'S DISEASE.

WITHIN recent years the eye signs in Graves's disease have been the subject of great interest and considerable study, which have no doubt been stimulated by the excellence of the modern operative treatment of thyreoid disease and the introduction of thiourea and thiouracil.

F. F. Rundle and C. W. Wilson, continuing their careful observations on exophthalmos, have attempted to trace the natural history of exophthalmos and ophthalmoplegia in Graves's disease.[1] They claim that no accurate studies have been made of the development and course of exophthalmos and that many of the statements made in the literature are misleading. Certainly it is not uncommon to read of the abrupt appearance of exophthalmos and of the variation of degree of this condition from day to day, but usually no real proof is presented other than unaided and more or less superficial observation. Similarly it is often stated in cases of jaundice that the degree of icterus varies from day to day without the backing of proof. Rundle and Wilson emphasize once more the difficulties of diagnosis of true exophthalmos caused by lid retraction, which by widening the palpebral fissure creates an illusion of prominence of the globe. Lid retraction may vary in degree, thereby causing some inaccuracy of observation unless some method which measures or records the protrusion of the eye is used. In this work Hertel's exophthalmometer has been used with a slight modification, and the vertometer has been employed in estimating the range of elevation of the eye, this being taken as the criterion of the eye movements. Of course, many studies have been made of ophthalmoplegia in Graves's disease; these afford evidences of essential change in the intrinsic eye muscles, and there seems little doubt there is a direct relation between these and the degree of protrusion. One statement made by the writers is challenging, that patients with Graves's disease do not usually come under observation while the eye is protruding, but as a rule later when the exophthalmos is stationary. Six patients in the static phase were studied. Two exemplified the purely exophthalmic form of Graves's disease, by which the authors mean the presence of characteristic eye changes without goitre or hyperthyreoidism. Four patients had been treated for hyperthyreoidism in the past and had residual exophthalmos. Over a period of some two years no greater variation in exophthalmos was observed in these patients than two millimetres, a change slight enough to warrant regarding the condition as static. No day-to-day variations were observed to any appreciable degree. Twelve other patients were studied who were in the dynamic phase, that is, who showed clear signs of alteration in the degree of exophthalmos. Serial measurements are presented as proof of the rate and degree of change. One patient was of particular interest, since five years after he was demonstrated as providing an example of unilateral exophthalmic ophthalmoplegia his other eye became proptosed with paralysis of elevation. Such asymmetry is, of course, well known. The relationship between proptosis and paralysis of elevation in this series was found to be graphically represented by a straight line, though the two conditions may reach their individual peaks independently. Conjunctival prolapse and resistance to backward pressure on the eyeball, both due to over-filling of the orbit, were noted and studied in several cases. Observations were made on 39 patients on whom thyreoidectomy had been performed, and from these it was concluded that the familiar cosmetic improvement usually noted in the eyes after thyreoidectomy depended rather on the lessening of the retraction of the lids than on a decrease in the size of the orbital contents. Indeed the random sample used in this study indicates that there is little average change in the prominence and elevation of the eyeball after thyreoidectomy. This is not really surprising, because the causal agent of the exophthalmic form of Graves's disease is a non-thyreoid hormone. The particular interest of this research is twofold. It is a purely clinical study and it is backed by measurement and accurate observation. Rundle and Wilson found that the average extent of exophthalmos in their cases was 2·0 to 5·0 millimetres. The rate of development averaged about 0·5 millimetre a month, representing a concomitant loss of elevation of 2° to 2·5°. Remissions were slower and also less complete than ingravescence, and the maximum recovery from ophthalmoplegia preceded that from proptosis.

Rundle has also published an account of a patient with an orbital varix. By constricting the veins of the neck it was readily possible to increase the filling of the orbit, and thus to observe and measure the changes caused. Rundle found that to produce comparable reduction in eye movements it was necessary to produce twice the amount of proptosis observed in cases of Graves's disease, and also noted that in his experimental case elevation was not the eye movement first or most severely affected. Little conclusion can be drawn from this, as the time factors are so different, and in addition there is the question of a myopathic factor in these eye palsies of Graves's disease. This subject is by no means played out. There is room for further studies on clinical material, such as the fully recorded case history published some time ago by Richard Flynn,[1] and on the early development of exophthalmos.

[1] *Clinical Science*, December, 1945.

[1] THE MEDICAL JOURNAL OF AUSTRALIA, April 15, 1944.

Abstracts from Medical Literature.

PHYSIOLOGY.

Afferent Nerves Excited by Intestinal Distension.

R. C. HERRIN AND W. J. MEEK (*The American Journal of Physiology*, October, 1945) state that distension of thirty fistulæ in the first portion of the jejunum in otherwise normal, conscious dogs resulted in vomiting and anorexia. The appearance and behaviour of the dog at that time gave the observer the impression that the dog was sick. Vagotomy did not abolish the vomiting or anorexia during intestinal distension. Bilateral splanchnicotomy and excision of the lumbar chain abolished the vomiting response to distension. Unilateral denervation was not sufficient. The impression of sickness given by the dog previously was absent, although anorexia was present. Splanchnicotomy, vagotomy and section of the lumbar chains abolished all symptoms due to intestinal distension in two dogs, but anorexia remained in three dogs. Splanchnicotomy, vagotomy and excision of lumbar chains abolished the anorexia and vomiting when the intestine was distended. It is concluded that the vomiting excited by intestinal distension is entirely of nervous origin and that the nervous impulses are conducted over the sympathetic nerves. The anorexia present with intestinal distension may be due to impulses from the vagi and also from the sympathetic nerves.

Observations on General Skin Temperature Responses to Local Heating.

D. MARTINEZ AND M. B. VISSCHER (*The American Journal of Physiology*, October, 1945) report studies of skin temperature measurements with nine normal male subjects exposed to local heating while maintained in a constant environment at a cold temperature. Local heating by immersion in water at 43° to 44° C. produces a larger rise in skin temperature in all locations except the back when the two forearms are immersed than when the legs, up to the knee, are immersed. Immersion of one leg alone does not produce a significant general skin temperature rise under these conditions. Immersion of both forearms with circulation occluded by pressure cuffs above the elbow results in no sustained rise in general skin temperature. The sensation of warmth in the forearms and hands is retained in spite of vascular occlusion. The subjective feeling of general bodily warmth is proportional to the general skin temperature rise. Except for the feet and the hands, the skin temperature rise following local heating is temporary in spite of continuous application. The rectal temperature remains constant within 0·2° C. in subjects in the cold room at 16·7° C. with or without application of local heat. There is a tendency for rectal temperature to fall slightly upon local heating. On the assumption that skin temperature changes reflect alterations in blood flow through the surface tissues, it is deduced that prolonged vasodilatation due to adequate local heating is probably mediated by some type of central mechanism. This is in agreement with earlier suggestions of the same sort. However, it is not believed possible that general body temperature can determine the effect because vasodilatation can occur with a falling rectal temperature.

The Effect of Bed Rest on the Blood Volume of Normal Young Men.

H. L. TAYLOR, L. ERICKSON, A. HENSCHEL AND A. KEYS (*The American Journal of Physiology*, July, 1945) studied the effect of three weeks of complete bed rest on the blood volume and its component parts in five normal young men. In four men studies were carried out during the course of reconditioning. In addition one of these men was studied before and after the surgical repair of an inguinal hernia. An average loss in blood volume of 572 millilitres or 9·3% occurred during the period of bed rest. This was almost entirely accounted for by a contraction of the plasma volume of 518 millilitres or 15·5%. The first week of reconditioning resulted in an increase in plasma volume to levels of the period prior to bed rest, but was accompanied by an apparent loss of red cells, so that the average increase of blood volume was only 235 millilitres. The subsequent apparent increase in blood volume to the original level was due entirely to an increase in red blood cells. The blood volume change of one man after the surgical repair of an inguinal hernia and three weeks' bed rest did not differ significantly from the changes observed in the same man after simple bed rest alone. Correlations between blood volume changes and various indices of deterioration of cardio-vascular function are discussed.

Reinnervation of Degenerated Muscle Fibres by Adjacent Functioning Motor Units.

A. VAN HARREVELD (*The American Journal of Physiology*, September, 1945) records that a severe paresis is produced in the quadriceps muscles and usually also in the sartorius muscle of the rabbit by pulling the sixth lumbar spinal nerve out of the spinal cord. The small contingent of motor fibres from the fifth lumbar segment forms the sole remaining motor innervation of these muscles. When the forces developed by the right and left sartorius and quadriceps muscles during the stimulation of the fibres from the fifth lumbar segment were recorded a few months after the removal of the sixth lumbar spinal nerve, it was found that the force produced on the side operated on was considerably larger than on the control side. This increase in muscle force starts about two weeks after the removal of the sixth lumbar nerve, it is considerable during the first few months and has probably not quite ceased after six months. No serious or obvious degeneration was usually found in the sartorius muscle two months after the removal of the sixth nerve, even in the instances in which this muscle was innervated originally only to a small extent by the fifth lumbar nerve (as indicated by the small forces developed on the control side during stimulation of the fifth lumbar nerve). The average surface of the muscle fibre cross section in the sartorius muscle on the side operated on was found to be larger than on the control side. It was concluded that the increase in force observed a few months after the partial denervation of the sartorius and quadriceps muscles is due mainly to an adoption by the motor units belonging to the fifth lumbar segment, of muscle fibres innervated originally by the sixth lumbar nerve. This adoption would be made possible by an increase of the branching of the end ramification of the motor fibres of the fifth lumbar segment. It is possible that the increase in thickness of the muscle fibres is an additional factor in the increase of muscle force of the partially denervated muscles.

Traumatic Calcification: A Precipitating Factor in "Bends" Pain.

J. H. ALLAN (*The Journal of Aviation Medicine*, August, 1945) discusses the nature of aeroembolism and indicates some of the factors which increase the incidence of bends. Impairment of circulation may be due to anatomical arrangement, injury or blood vessel spasm. Recent investigations suggest that gaseous bubble formation at high altitudes is favoured in areas of poor blood supply, high fat content, injury, crystal formation, and in the presence of vascular spasm. Certain disturbances of bone occur as a result of interference with blood supply, notably traumatic calcifications in and about tendons and aseptic necrosis of bone. There is a correlation between the factors which favour bubble formation at altitude and calcific disturbances at sea level. Five cases of calcific disturbances are presented in which bends pain either has occurred repeatedly in areas of calcification, or has occurred at an altitude low enough to eliminate other factors which cause production of the "bends". One case presents "bends" occurring in actual combat and at a lower altitude than any previously reported in the literature.

Visual Thresholds as an Index of the Modification of Anoxia by Glucose.

R. A. MCFARLAND, M. H. HALPERIN AND J. I. NIVEN (*The American Journal of Physiology*, August, 1945) state that the measurement of differential intensity thresholds for vision at low brightness levels provides a sensitive and objective index of the impairment caused by anoxia. This test was applied to the study of the modification of this impairment by glucose. Three fasting subjects were used at simulated altitudes of 12,700 to 17,200 feet. The ingestion of 50 grammes of glucose during exposure to low oxygen tensions (simulated high altitude) resulted in a considerable decrease in the impairment due to anoxia. At a simulated altitude of 13,800 feet the administration of glucose diminished the visual impairment of one subject to an amount corresponding to an altitude of only 8,000 feet. The "physiological altitude" was thus 42% lower than the actual altitude. In the other two subjects the lowering of physiological altitude was 25% and 48% respectively. The ingestion of glucose one-half hour before exposure to low oxygen tensions likewise prevented a large part of the

impairment expected from anoxia. Control experiments, in which a saccharin solution was given at simulated high altitudes instead of glucose, showed no effects on the impairment caused by anoxia. The administration of glucose to fasting subjects at a normal atmospheric oxygen tension resulted in no improvement of visual sensitivity. An improvement occurred only if visual sensitivity had first been impaired by anoxia. The amount of improvement of visual sensitivity during anoxia after glucose administration, in relation to time, was approximately parallel to the blood sugar curve during its rise and subsequent fall. The increase in carbon dioxide production after glucose ingestion lags behind the rise in the blood sugar content and declines considerably later than the fall in blood sugar content. The "anti-anoxic" effect of glucose therefore seems to depend directly on the blood sugar level rather than on the secondary increase in carbon dioxide production.

BIOCHEMISTRY.

Calcium Pantothenate.

R. H. SILBER (*Archives of Biochemistry*, July, 1945) has found significant differences in the excretion by normal and depleted dogs of test doses of calcium pantothenate given orally or subcutaneously. Intestinal absorption did not appear to be impaired by pantothenic acid depletion as judged by excretion of oral doses of riboflavin. The urinary excretion of an oral dose of calcium pantothenate by dogs may be as much as 50% or as little as 1% of the dose, in inverse relation to the amount of diet consumed with the vitamin. When food was supplied *ad libitum*, a large fraction of the dose passed through the intestinal tract unabsorbed. After parenteral administration of calcium pantothenate, no increase in fæcal pantothenate was detected. In a four-hour period, a group of ten laboratory workers excreted 10% of a 50 milligramme dose of calcium pantothenate.

Pantothenic Acid.

H. P. SARETT (*The Journal of Biological Chemistry*, July, 1945) has studied the metabolism of pantothenic acid and its lactone moiety in man. The pantothenic acid and total lactone content was measured in the urine of three male subjects on normal diets, and after oral and intravenous administration of pantothenic acid and its lactone or dihydroxy acid moieties. The normal pantothenic acid excretion averaged 3·5 milligrammes per day and accounted for the total lactone present, as measured after alkaline hydrolysis of the urine. After 100 milligramme oral doses of pantothenic acid an average of 15 milligrammes of additional pantothenic acid and 2·6 milligrammes of extra lactone were found in the urine. Intravenous administration of the same amount of pantothenate resulted in the excretion of 35 milligrammes of additional pantothenate. This accounted for all of the lactone present. Oral or intravenous doses of 50 milligrammes of lactone and intravenous doses of 50 milligrammes of the dihydroxy acid were completely recovered in the urine. After oral doses of the dihydroxy acid, only 80% was found in two of the samples of urine. After oral doses of the lactone or of the dihydroxy acid, the daily pantothenic acid excretion increased to about six milligrammes. It was concluded that the lactone or the dihydroxy acid moieties are not normal intermediates in the metabolism of pantothenic acid in man.

Folic Acid.

B. C. JOHNSON *et alii* (*The Journal of Biological Chemistry*, July, 1945) have shown that man excretes folic acid in the sweat as well as in the urine. Approximately five times as much active folic acid as determined by *Lactobacillus casei* was excreted per hour in the sweat as in the urine, and about six times as much as determined by the *Streptococcus lactis* assay under conditions of profuse sweating. The amount of folic acid found in urine was not increased by incubation with vitamin B_c conjugase.

Bone Formation.

A. C. KUYPER (*The Journal of Biological Chemistry*, July, 1945) has studied the precipitates formed from salt solutions. When calcium phosphate is precipitated from salt solutions under physiological conditions of pH, temperature and ionic strength, the composition of the precipitate varies with the composition of the precipitating solution. When calcium, magnesium, phosphate, bicarbonate and citrate are present in the supernatant solution in the amounts in which they are present in serum ultrafiltrate, the precipitate contains these substances in approximately the same molecular ratios in which they are present in bone or dentine. When these substances are present in the supernatant solution in the amounts in which they are present in saliva, the precipitate contains them in roughly the same molecular ratios in which they are present in enamel.

A. C. KUYPER (*ibidem*) has also studied some of the factors which affect the solubility of calcium phosphate in blood serum. Calcium phosphate is precipitated from solutions of the serum salts when calcium and phosphate are present in excess of the amounts found in serum ultrafiltrate. When precipitation has once begun, it continues until the amounts of calcium and phosphate in the supernatant solution are much less than the amounts present in serum ultrafiltrate. The calcium phosphate which is precipitated from serum salt solutions has a varying solubility. It is most soluble when first formed from dilute solutions; the solubility decreases as the precipitate remains in the solution. Reliable solubility measurements require the presence of large amounts of solid in the equilibrium mixtures. Solubility values were established by approach from both supersaturation and undersaturation. Changes in solubility may be attributed to changes in the composition of the precipitate. The presence of magnesium and citrate in the precipitate and in the supernatant solution increases the solubility of calcium phosphate precipitate. When these substances are present in the supernatant solution in amounts equivalent to their concentrations in serum, the solubility of the precipitate measured a few days after its formation corresponds closely to the amounts of ionic, and approaches values of diffusible calcium and phosphate in blood serum. The presence of pyrophosphate in the precipitating solution increases the solubility of calcium orthophosphate. Inorganic pyrophosphate is precipitated and cannot be detected in the supernatant solution.

Plasma Fibrinogen.

J. B. FIELD *et alii* (*The Journal of Biological Chemistry*, July, 1945) studied the action of methyl xanthines on the level of plasma fibrinogen. The oral administration of the methyl xanthines, caffeine, theobromine and theophylline, to dogs and rabbits raises the level of plasma fibrinogen. Xanthine, adenine, uric acid guanidine and glycocyamine increased the fibrinogen content in the rabbit, but not in the dog. The rabbit was markedly more susceptible to the fibrinogen-increasing capacity of methyl xanthines than the dog. Depending on the dose, an increased fibrinogen level may persist in the rabbit for two to three weeks.

Fatty Liver.

M. L. MACFARLAND AND E. W. MCHENRY (*The Journal of Biological Chemistry*, August, 1945) have reported that the administration of a beef liver fraction to rats maintained on a diet with a high carbohydrate content and free from fat causes the production of fatty livers resistant to choline, but the liver fat can be reduced to low levels by supplying inositol. The use of biotin in place of the liver fraction causes fatty livers which are partially responsive to either lipotropic agent and completely prevented by a conjoint supply of choline and inositol.

Glycogenesis.

D. STETTIN AND B. V. KLEIN (*The Journal of Biological Chemistry*, August, 1945) have used the isotope technique to study the formation of glycogen in the previously fasted rat in response to adrenaline and to insulin. The data secured support the hypothesis that the glycogen appearing in the liver of a fasted rat after injection of adrenaline is formed from blood lactate. The glycogen appearing in the muscle of rats after administration of insulin is apparently formed largely from hexose directly. The failure of lipogenesis in the alloxan-diabetic rat was confirmed. The synthesis of fatty acids has been shown to be markedly impaired, whether glucose or alanine constitutes the bulk of the diet. No comparable impairment in lipogenesis was found to occur in the phlorizinized rat. The quantity of glucose synthesized *in vivo* in the alloxan-diabetic rat is no greater than the corresponding quantity in the phlorizinized rat. The actual quantity synthesized in an adult male rat has been estimated to lie in the neighbourhood of three to five grammes per day.

DDT.

H. A. STIFF AND J. C. CASTILLO (*The Journal of Biological Chemistry*, July, 1945) have shown that DDT was not detectable in the organs or body fluids of rabbits by the xanthydrol-KoH-pyridine method when toxic doses of this substance were administered orally to these animals. They conclude that DDT is not present as such in the organs and body fluids after oral administration, but is present in the form of a metabolic-containing organically bound chlorine.

Public Health.

THE NATIONAL HEALTH SERVICE BILL OF GREAT BRITAIN.

The following is a copy of the "White Paper" issued in London on the afternoon of March 21, 1946, containing a general description of the proposed health service with which the National Health Service Bill deals. It is intended as a factual summary only; comment and argument are omitted. It is explained that, being only a summary, the paper cannot always be in precise terms and that it is to the Bill itself that anyone must look for more exact definition of what is proposed.

Introductory.

1. The Bill provides for the establishment of a comprehensive health service in England and Wales. A further Bill to provide for Scotland will be introduced later.

2. The Bill does not deal in detail with everything involved in the service. It deals with the main structure. Within that structure, further provision will be made by statutory regulations—on lines which the Bill lays down and subject always to the control of Parliament.

Scope of the Service.

3. The Bill provides for the following kinds of health services:

(i) Hospital and specialist services—i.e. all forms of general and special hospital provision, including mental hospitals, together with sanatoria, maternity accommodation, treatment during convalescence, medical rehabilitation and other institutional treatment. These cover in-patient and out-patient services, the latter including clinics and dispensaries operated as part of any specialist service. The advice and services of specialists of all kinds are also to be made available, where necessary, at Health Centres and in the patient's home.

(ii) Health Centres and general practitioner services—i.e. general personal health care by doctors and dentists whom the patient chooses. These personal practitioner services are to be available both from new publicly equipped Health Centres and also from the practitioners' own surgeries.

(iii) Various supplementary services—including midwifery, maternity and child welfare, health visiting, home-nursing, a priority dental service for children and expectant and nursing mothers, domestic help where needed on health grounds, vaccination and immunization against infectious diseases, additional special care and after-care in cases of illness, ambulance services, blood transfusion and laboratory services. (Special school health services are already provided for in the Eduction Act of 1944.)

(iv) The provision of spectacles, dentures and other appliances, together with drugs and medicines—at hospitals, Health Centres, clinics, pharmacists' shops and elsewhere, as may be appropriate.

Availability of the Service.

4. All the service, or any part of it, is to be available to everyone in England and Wales. The Bill imposes no limitations on availability—e.g. limitations based on financial means, age, sex, employment or vocation, area of residence, or insurance qualification.

5. The last is important. If the National Insurance Bill now before Parliament is passed into law, almost everyone will become compulsorily insurable, and after payment of the appropriate contributions will become entitled to the various cash benefits—including sickness and maternity benefits—for which that Bill provides. A proportion of their contributions will be used to help to finance the health services under the present Bill, but the various health service benefits under the present Bill are not made conditional upon any insurance qualification or the proof of having paid contributions. There are no waiting or qualifying periods.

6. The service is to be available from a date to be declared by Order in Council under the Bill, and it is hoped that this will be at the beginning of the year 1948.

The Service to be Free of Fees or Charges.

7. The health service is to be financed partly from the exchequer, partly from local rates, partly from the help (mentioned above) which part of the National Insurance contributions will give. There are to be no fees or charges to the patient, with the following exceptions:

(i) There will be some charges (to be prescribed later by regulations) for the renewal or repair of spectacles, dentures and other appliances, where this is made necessary through negligence in the care of the articles provided.

(ii) There will be charges (taking into account ability to pay) for the provision of domestic help under the Bill and for certain goods or articles (e.g. supplementary foods, blankets, etc.) which may be provided in connection with maternity and child welfare or the special care or after-care of the sick.

(iii) It will be open to people if they wish, in certain cases, to pay for additional amenities within the arrangements of the service—e.g. to pay extra for articles or appliances of higher cost than those normally made available, or to pay charges for private rooms in hospitals (which they will nevertheless be able to obtain free where privacy is medically necessary).

General Organization of the Service.

8. The Bill places a general duty upon the Minister of Health to promote a comprehensive health service for the improvement of the physical and mental health of the people of England and Wales, and for the prevention, diagnosis and treatment of illness. To bring physical and mental health closer together in a single service, it transfers to the Minister the present administrative functions of the Board of Control in regard to mental health (the Board retaining only its quasi-judicial functions connected with the liberty of the subject).

9. The Bill proposes that the Minister shall discharge his general responsibility through three main channels:

(*a*) For parts of the service to be organized on a new national or regional basis—i.e. hospital and specialist services, blood transfusion and bacteriological laboratories for the control of epidemics—the Minister is to assume direct responsibility; but he is to entrust the actual administration of the hospital and specialist services to new regional and local bodies established under the Bill. These bodies are to act on his behalf in suitable areas to be prescribed by him, and they are to include people of practical experience and local knowledge and some with professional qualifications. Special provision is made for hospitals which are the centres of medical and dental teaching.

(*b*) For parts of the service to be organized as a function of local government—i.e. the provision of new Health Centre premises and a variety of local domiciliary and clinic services—direct responsibility is put upon the major local authorities, the county and county borough councils. They will stand in their ordinary constitutional relationship with the central Ministry, but their general arrangements for these local services are made subject to the Minister's approval.

(*c*) For the personal practitioner services both in the Health Centres and outside—i.e. the family doctor and dentist and the pharmacist—new local executive machinery is created, in the form of local Executive Councils. One-half of the members of each of these Councils will consist of people nominated by the major local authorities and by the Minister, and the other half of people nominated by the local professional practitioners concerned. There will normally be an Executive Council for each of the major local authorities' areas, and they will work within national regulations made by the Minister.

10. By the Minister's side, to provide him with professional and technical guidance, there is to be set up a Central Health Services Council. This will include people chosen from all the main fields of experience within the service—with various standing committees of experts on particular subjects, medical, dental, nursing and others.

11. Each of these branches of the new organization is described in more detail in the rest of this paper.

Hospital and Specialist Service.

12. This part of the service covers hospital and consultant services of all kinds, including general and special hospitals, maternity accommodation, tuberculosis sanatoria, infectious diseases units, provision for the chronic sick, mental hospitals and mental deficiency institutions, accommodation for convalescent treatment and medical rehabilitation, and all forms of specialized treatment—e.g. orthopædics, cancer, neurosurgery, plastic surgery, pædiatrics, gynæcology, ophthalmic services, ear, nose and throat treatment, and others

13. It is made the Minister's general duty to provide these physical and mental hospital services, but he is to entrust their administration to Regional Hospital Boards, together with separate Boards of Governors for the teaching hospitals, in manner to be described later.

14. The existing premises and equipment of voluntary and public hospitals are transferred to the Minister under the Bill, and he is empowered also to acquire by purchase—if necessary—other hospitals and their equipment which may be required for the purposes of the new service. If in any particular case he is satisfied that the transfer of a hospital is not in fact necessary for the new service he can—with that institution's concurrence—except it from transfer. The general transfer of hospitals includes the present mental hospitals and mental deficiency institutions.

15. The endowments of voluntary teaching hospitals—defined in the Bill to mean, broadly, all their property other than buildings and their contents—will pass, not to the Minister, but directly to the new Boards of Governors, who are to be free to use them as they think best, but are required, so far as practicable, to see that the purposes for which they were previously usable are still observed.

16. The endowments of other voluntary hospitals are to pass to a new Hospital Endowment Fund which the Minister is to set up and administer in the following way. He is first to meet from the Fund, to such extent as may be settled by subsequent regulations, existing debts and liabilities attaching to the voluntary hospitals concerned. He is then to apportion the capital value of the Fund among the several Regional Hospital Boards and, as it were, to earmark to each a portion. The income of each portion will then pass automatically to each Board, and it will be free to use it as it wishes, within such general conditions as may be prescribed. Any Board will be able also at any time to draw on its portion of the capital for any purpose which the Minister approves.

17. The Boards—and the Boards of Governors of teaching hospitals—are fully able under the Bill to receive gifts or legacies, and to hold any property on trust, for any purposes connected with the hospital or health services.

18. The detailed arrangements affecting the new Hospital Endowment Fund, its apportionment and administration, are left to be settled by later statutory regulations.

Hospital Administration.

19. The Minister is to entrust the future administration of all the hospitals (other than teaching hospitals) to Regional Hospital Boards to be set up under the Bill for such hospital service regions of the country as he will prescribe—each region being such that its services can conveniently be associated with a university medical school. There will probably be between sixteen and twenty of these regions.

20. Each Board will be composed of people chosen and appointed by the Minister for their individual suitability for the task, but before making the appointments the Minister is to consult any university with a medical school in the region, bodies representative of the medical profession, the local health authorities of the area, and others concerned including, initially, those with experience of the voluntary hospital system. The Boards are to include some members with experience of the mental health services.

21. Each Board is required by the Bill to appoint, in accordance with a scheme approved by the Minister, local Hospital Management Committees, one for each large hospital or related group of hospitals forming a reasonably self-contained hospital service unit. Each of these Management Committees will contain members appointed after consulting the major local authorities in its area, the Executive Councils for the general practitioner services in its area, the senior medical and dental staff of the hospitals concerned, and others, including those with experience in voluntary hospitals.

22. It is to be the duty of the Regional Boards, within the scope of general regulations and such particular directions as the Minister may give, to undertake on his behalf the general administration of the hospital and specialist services in their regions. With the Minister, and in collaboration with the teaching hospitals, each Board will plan, and execute the plan for, a coordinated hospital and specialist service for its region.

23. It is to be the duty of the Management Committees to carry out day-to-day management of the particular hospitals under their control—within such limits as are to be prescribed by the Minister. They are to be the local managing bodies on the spot, and they will, for example, appoint nursing and other general staff (appointing them as employees of the Regional Boards). They will be able, as required, to set up small house committees for any individual hospitals within their care.

24. It is the object that the Regional Boards, with their local Management Committees, shall enjoy a high degree of independence and autonomy within their own fields. Their use of existing voluntary hospital endowments has already been described. For the general financing of their hospital services, however, they will look to the Exchequer and they will be given as much financial freedom—by a system of block annual budgets or otherwise—for local initiative and variety of enterprise as general principles of exchequer responsibility make possible.

Teaching Hospitals.

25. Special arrangements are provided for teaching hospitals—that is, hospitals or groups of related hospitals which are designated by the Minister as providing the facilities for undergraduate or post-graduate clinical teaching. These will enable any hospital or group of hospitals to attain "teaching" status whether it is already a teaching hospital at the outset of the scheme or not.

26. The general system of Regional Boards and Management Committees will not cover the teaching hospitals. The Minister is to constitute for each such hospital or group of hospitals its own separate Board of Governors, including members nominated by the university, the Regional Board for the area, and the senior staff of the hospital itself and members appointed after consultation with the major local authorities and other organizations concerned, including the previous governing bodies. The Board of Governors of a teaching hospital will be responsible generally for administering their hospital on the Minister's behalf.

27. The financial arrangements in regard to existing voluntary endowments of the teaching hospitals have already been described. For the general financing of their services they will look to the exchequer and again the general object will be to assure them all the financial freedom and autonomy of management which the general conception of a nationally reorganized and nationally financed service makes possible. In this case, in addition, it is intended to keep in the forefront of any arrangements the special position of these hospitals as the centres of clinical teaching and technical experiment and innovation.

28. The fact that special administrative and financial arrangements may be made for teaching hospitals does not mean, however, that these hospitals are not to form an integral part of the hospital service as a whole. They will be joined with the Minister and the Regional Boards in the general planning and arrangements of the hospital services of each Region, and the Regional Boards will be represented on their Boards of Governors.

Medical and Dental Schools.

29. Medical and dental schools are not to be transferred to the Minister or to the Board of Governors of the teaching hospitals with which they are associated. No property which is held for the purposes of these schools is to be transferred. The schools will continue to be owned and administered, in London, by their own governing bodies, and elsewhere by the governing bodies of the universities of which they form part; and the Bill provides for the transfer of any existing hospital property held for school purposes to these governing bodies.

30. The Bill contains also a special provision relating to medical and dental schools, based on recommendations of the Interdepartmental Committee on Medical Schools (the Goodenough Committee). Any medical or dental school of London University which is not yet a body corporate is required to take steps within six months of the passing of the Bill to become incorporated.

Hospital Staffs.

31. The staff of all hospitals in the service will be in the employment of the Regional Boards or Boards of Governors of teaching hospitals, as the case may be. Specialists taking part in the service, whole-time or part-time, will be attached to the staff of hospitals. Part-time participation in the service will not debar the specialists from also continuing any private practice outside the service which individual patients may wish them to undertake.

32. Special provision is to be made by regulations affecting the appointment of senior medical and dental staff employed on the staff of hospitals. In these cases the Regional Board or the Board of Governors, as the case may be, is to be required to advertise vacancies and to constitute an expert advisory appointments committee. This committee will draw up a list, from among the applicants, of those suitable by qualification and experience for the vacancy, and the person to be appointed will then be selected from that list by the Board.

33. The Boards will determine the terms of engagement of any staff employed in the hospital service. The Minister, however, is empowered to make regulations governing the

qualifications, conditions of service and remuneration of any or all classes of hospital staff—as of the staff engaged in any other part of the health service. Before making regulations he will consult any appropriate organizations representing the staffs concerned, and it will be his intention—wherever appropriate—to use existing, or set up new, negotiating machinery to facilitate those consultations. Existing hospital officers employed on a paid whole-time basis are to be protected, either by being transferred to the new bodies or by compensation if they are not transferred or are re-employed on less favourable terms than before.

"Pay-Bed" Accommodation.

34. Where there are single bedrooms or small wards in hospitals the Minister is empowered to make them available to patients who wish to buy greater privacy by paying the extra cost; but this is to be subject always to the requirements of patients who need such accommodation on medical grounds, and they will be able to have it without payment.

35. In addition, the Minister is empowered to provide separate pay-bedrooms or blocks for which people can pay the whole cost privately and in which part-time specialists within the service can treat private patients. This power is subject to the Minister's deciding, in each hospital, whether it is reasonable to provide such private accommodation having regard to the needs of the general service, and it is also subject to the overriding right of other patients to be admitted to it, without payment, if medical considerations urgently require it. Private patients using the accommodation will pay their own specialists' fees, but the Bill enables the Minister to prescribe maximum fees which specialists may charge in these circumstances.

Other Centralized Services.

36. The Minister is made directly responsible for the provision of two other services, both of them developed from services which have grown up during the war.

37. The first is a bacteriological service for the control of the spread of infectious diseases, including, in particular, the provision of laboratories. These will be operated—at least in the first instance—by the Medical Research Council on the Minister's behalf and their services can be made available to medical men and others who wish to make use of them.

38. The second is a blood transfusion service—for the collection of blood from volunteer donors, the provision of "blood banks" and blood products at hospitals, and of mobile transfusion teams which will be on call for hospitals not possessing facilities of their own and for specialists and general practitioners.

39. The Minister is also expressly empowered by the Bill to conduct research, and to give financial help to voluntary agencies conducting research into any question relating to the prevention, diagnosis or treatment of illness or mental defectiveness. Boards of Governors of teaching hospitals and Regional Boards are also empowered to conduct research.

General Practitioner Services.

40. This part of the service covers the personal health services provided by general medical practitioners and dentists and the supply of drugs, medicines and appliances.

41. To arrange these services locally new bodies—to be called Executive Councils—are to be established in the area of each county and county borough. As already explained, each Council is to be so composed that one half of its members are professional—appointed by the local doctors, dentists and chemists through their own representative committees in the area—while the other half of the members are to be appointed partly by the local county or county borough council (one-third of the Executive Council) and partly by the Minister (one-sixth). The Chairman will be appointed by the Minister. Single Executive Councils may sometimes be established for the areas of two or more local authorities.

Health Centres.

42. A main feature of the personal practitioner services is to be the development of Health Centres. The object is that the Health Centre system, based on premises technically equipped and staffed at public cost, shall afford facilities both for the general medical and dental services (described immediately below) and also for many of the special clinic services of the local health authorities (described later), and sometimes also for out-post clinics of the hospital and specialist services (already described). Beside forming a base for these services—e.g. providing doctors with equipped and staffed consulting rooms in which to see their patients—the Centres will also be able to serve as bases for various activities in health education.

43. The Bill makes it the duty of the county and county borough councils to provide, equip, staff and maintain the new Health Centres to the satisfaction of the Minister. The local authorities will directly administer such of their own local clinic facilities as they may provide in the Centres. Doctors and dentists, however, who use the new Centres while participating in the general personal practitioner service will be in contact only with the new Executive Councils, and it will be for those Councils to arrange with the local authorities for the use of the Centres' facilities by those doctors and dentists. In the case, for instance, of doctors in the general practitioner service the Centres will, in effect, stand in place of the doctors' own surgeries and the doctors' responsibilities to their patients on their personal lists—e.g. in visiting their patients' homes and in general responsibility for their patients at all times—are not affected by whether a doctor practises from a Health Centre or not.

Family Doctor Service.

44. All doctors are to be entitled to take part in the new arrangements in the areas where they are already practising when the scheme begins. Taking part will not debar them from also continuing to make private arrangements for treating such people as still wish to be treated outside the service instead of taking advantage of the new arrangements, provided that such persons are not on their lists as public patients or on the lists of their partners in a Health Centre. People will be free to choose their own doctor (including their present doctor) subject to the doctor's consenting and being in a position to undertake their care.

45. All doctors taking part in this part of the new service will be in contract with the Executive Council for the area in which they practise. The Executive Council will be required to draw up and publish lists of all general practitioners who wish to participate. People will then choose their doctor and each doctor will have his own list of the people whom he has agreed to attend. There will be machinery for allocating among the doctors concerned such people as wish to take advantage of the service but have not chosen a doctor for themselves or have been refused by the doctor chosen by them. The relationship of the doctor with any person on his list—i.e. his functions under this part of the service—will then be similar to the ordinary relationship of doctor to patient as it is now known, except that the doctor's remuneration will come from public funds and not directly from the patient.

46. The Bill itself does not determine the detailed terms and conditions for doctors joining in the service or the doctors' remuneration. These are left to be settled by regulations and the necessary regulations will be made in consultation with the doctors' professional representatives. It is, however, the intention that remuneration should take the form of a combination of fixed part-salary and of capitation fees, the latter varying with the number of persons whose care is undertaken by each doctor and being so graduated as to diminish in scale as the total number of patients rises. Variations of the fixed part-salary will be possible so as to take account of different circumstances and experience and the differing conditions of practice in particular areas. It is intended also to institute, under powers contained in the Bill, a contributory superannuation scheme for doctors taking part in the new arrangements.

47. Actual rates of remuneration for doctors can be determined, in consultation with the profession, only after the report has been received of the Spens Committee—a special committee set up, by agreement with the profession's representatives and under the chairmanship of Sir Will Spens, with a membership half medical and half non-medical, to make an independent report on the appropriate range of remuneration for doctors taking part in a publicly organized service of this kind.

48. When the necessary regulations affecting terms of service and remuneration have been settled it will be for the Executive Councils to contract with the doctors on the lines thus prescribed.

Distribution of Medical Practices.

49. To help in dealing with the needs of under-doctored areas it is intended, as already indicated, to adjust the scales of remuneration of doctors so as to provide additional inducement to practise in less attractive areas. In addition, a new body to be called the Medical Practices Committee, mainly professional in composition, is to be appointed under the Bill to regulate in future the succession to old, or the opening of new, practices within the service.

50. To begin with, an appointed day will be fixed and all doctors then in practice will have the right to have their names included on the lists drawn up by the Executive

Councils for the areas in which their existing practices are. After the appointed day any doctor who wishes either to join the public service for the first time or, if he is already in it, to go and practise in a new area will need to obtain the consent of the Medical Practices Committee. He will normally ask to have his name included in the list of the Executive Council for the area of his choice and that Council will inform the Committee. The Committee may give consent either unconditionally or subject to a condition as to the general part of an Executive Council's area in which he practises. They will not be able to withhold consent on any ground except that there are already enough doctors practising in the public service in the area in question. If, when a practice becomes vacant in a particular area, there is more than one applicant for taking it over, the Committee will decide to which doctor the necessary consent is to be given. A doctor whose application to practise in a particular area is refused, or granted only subject to conditions, is given the right to appeal to the Minister.

51. Regulations governing all these arrangements will, among other things, require Executive Councils to report from time to time to the Medical Practices Committee on the number of doctors required to meet the needs of their areas and on the existence of vacant practices on their lists.

Sale and Purchase of Practices and Compensation.

52. The above control of succession to, or opening of, practices will apply to all practices which are wholly or partly within the service. It will, therefore, make the sale of the goodwill of such practices inappropriate, and the Bill provides for the prohibition of the sale of such practices in future and for compensation to existing practitioners in respect of the consequent loss of selling values.

53. Doctors who join in the public service at the outset will be entitled to compensation in respect of loss incurred through being unable thereafter to sell their practices. In addition, any doctor who dies or retires from practice between the passing of the Act and the appointed day, and whose practice has not been sold in the meantime, will qualify for compensation. If he is compensated, his practice will be regarded as having come within the service at the appointed day.

54. The total amount of compensation to be made available to the profession under the Bill is a sum of £66 millions for England and Wales and Scotland, and the appropriate proportion of this is authorized to be paid in England and Wales under the present Bill. Provision is made for the total sum to be reduced if the number of practitioners taking part in the service falls substantially short of the expected total.

55. Regulations will govern the detailed method of apportioning the global sum among the doctors entitled to compensation and the manner and times at which it is to be paid. It is intended that the settling of the apportionment of compensation among the individual doctors shall be left in the main to the profession itself and the Minister will accept any reasonable proposals within the total sum. Normally compensation is to be payable on the retirement or death of a doctor, though payment at an earlier date will be arranged where hardship (e.g. through outstanding debts) would otherwise arise. In the meantime interest on the compensation due is to be paid each year to the doctor at the rate of two and three-quarter per cent. per annum.

Doctors and the Health Centres.

56. As and where the new Health Centres are developed, existing doctors in the area will be able, if they wish, to use the consulting rooms and other facilities so provided in place of their present surgeries, so far as they are participating in the new service. Their doing so will not affect the general arrangements already described.

57. Any group of doctors joining in practice from a Health Centre, however, will be encouraged—wherever possible—to enter into a partnership arrangement whereby their joint remuneration within the service is pooled and then divided among them on some agreed basis of apportionment.

Supply of Drugs, Medicines and Appliances.

58. Those who use the general practitioner service will be entitled to the supply, free of charge, of necessary drugs, medicines and appliances. A charge will be made if appliances have to be prematurely repaired or replaced as a result of carelessness, and if the patient chooses to be supplied with more expensive appliances than those normally supplied he will be expected to meet the additional cost involved.

59. Every properly qualified pharmacist who wishes to join in the new service will have the right to do so. The Executive Council in each area is to draw up and publish a list of pharmacists who join in the service, and patients will be able to obtain their supplies on the prescription of their doctor either from the shops or other premises of a pharmacist or from any Health Centre where dispensing services are provided, as the patient chooses. Drugs, medicines and appliances required for hospital purposes will be supplied as part of the hospital service.

60. Regulations, made in consultation with the professional organizations concerned, will govern the detailed terms and conditions, and rates of remuneration on which pharmacists participate in the new arrangements.

Dental Service.

61. The arrangements for dental services will be on rather a different basis from the family doctor service. Priority will be given to expectant mothers and young people. This is to be done through the local health authority's maternity and child welfare service (which the Bill expressly provides is to include dental care) and through the school health services under the Education Act, 1944. Outside the priority arrangements there will be a general dental service made available, but there will not at first be any guarantee that all people will be able to obtain full dental care without waiting. Any dentist who wishes to participate in the general dental service will have the right to do so, and the Executive Council in each area will draw up and publish a list of those who undertake to participate in the service.

62. The object will be to develop general dental services in the Health Centres, or corresponding Dental Centres, as much and as quickly as possible. In the Centres it is intended that dentists shall be able to participate either whole-time or part-time and shall be remunerated by appropriate salaries for the amount of time which they give to the new service. Outside the Centres it will be open to anyone to arrange with any dentist in his own surgery who agrees to undertake his or her dental care. The dentist will normally be able to start treatment without further reference and subsequently to submit a claim for payment from public funds. For certain forms of treatment, however, the dentist will submit an estimate of what is required to a new professional body established by the Bill—the Dental Estimates Board. The Board will have branch offices in different parts of the country whose function it will be to approve dentists' estimates for treatment to be given or appliances to be supplied. Payment will be made to the dentist by the Executive Council in accordance with a prescribed scale of fees or, in some cases, on special estimates determined by the Dental Estimates Board.

63. The detailed terms and conditions, and rates of remuneration, on which dentists will participate in the service are not settled in the Bill itself, but—as with the doctors—are to be the subject of subsequent regulations made in consultation with the profession's representatives. The general range of remuneration is to be settled in the light of the findings of a committee established (by agreement with the profession) on lines similar to the Spens Committee on doctors' remuneration. Dentists taking part in the general dental service will not be debarred from treating under private arrangements anyone who does not wish to take advantage of the service.

64. When the appropriate regulations affecting remuneration and general conditions of participation in the service have been settled, it will be for the Executive Council to contract with the dentists on the lines so prescribed.

Eye Services.

65. The object is to secure that the care of the eyes, with sight-testing and the supply of spectacles, is carried out—as rapidly as resources allow—in special ophthalmic departments and clinics forming part of the hospital and specialist service. These clinics will be in the charge of specialist medical ophthalmologists, and in them the qualified sight-testing opticians will also play their proper professional part. Spectacles will be obtained either at the clinics themselves or at the premises of dispensing opticians taking part in the service.

66. While this full eye clinic system is developing, however, a supplementary eye service is to be arranged by the Executive Councils in each area. Their arrangements are to be made with suitably qualified general medical practitioners, sight-testing opticians and dispensing opticians who undertake the supply of spectacles. The whole of the arrangements are to be entrusted by each Executive Council to a special committee—an Ophthalmic Services Committee—which will draw up and publish lists of the medical practi-

tioners and opticians who have the necessary qualifications and who wish to participate in the service, on the same lines as the lists of doctors and dentists. The patient will then have freedom of choice among the doctors and opticians on the lists.

67. As in the rest of the general practitioner services, the terms and conditions and rates of remuneration of those participating in the supplementary eye service, arranged by the special Committee of the Executive Council above, will be the subject of later regulations.

68. People will be entitled both to sight-testing and to the supply of spectacles, free of charge, either at the specialist ophthalmic clinics or through the supplementary scheme just described. The Bill provides, however, that as soon as the Minister is satsified that adequate ophthalmic services are being provided in any area through the specialist clinic services he may wind up the supplementary service in that area.

Miscellaneous.

69. A special Tribunal is to be set up to investigate cases where it is claimed—either by the Executive Councils or otherwise—that the continued inclusion of any doctor, chemist, dentist or optician in the lists drawn up by the Executive Councils would be prejudicial to the efficiency of the service. The Tribunal will have a legal chairman appointed by the Lord Chancellor and will in each case include a member of the same profession as the person whose case is being investigated and one other—the latter two being appointed by the Minister. Where it is satisfied that the representations are justified, the Executive Council will be directed to remove from the list the name of the doctor, dentist, chemist or optician, who is given the right to appeal to the Minister. Where the Tribunal so decides a similar direction can be applied to all lists in all areas, with the same right of appeal.

70. Provision is also made that where any doctor, dentist, chemist or optician has already been disqualified from participation in the present National Health Insurance service, and the disqualification has not been removed, he shall not have the right to participate in the new service.

71. Where the Minister is satisfied, after inquiry, that the services provided by doctors, dentists, or chemists in any particular area are not adequate he is empowered to take such steps as he considers necessary to secure an adequate service.

72. The Minister is empowered to arrange with universities and medical and dental schools for the provision of "refresher" courses for doctors and dentists in the service, to contribute towards the cost of these courses and to pay the expenses of doctors and dentists attending them.

Local Government Services.

73. This part of the health service comprises the local and domiciliary services which are appropriate to local government, rather than to central government or to any specially devised machinery. The Bill unifies these services in the existing major local authorities—the county and county borough councils—and provides for the formation of joint boards wherever, exceptionally, this may be found desirable.

74. For most of these services, the Bill requires the local health authorities (as they are to be called) to indicate to the Minister the way in which they intend to carry out their responsibilities, and it requires the Minister's general approval. Their proposals, so indicated, are to be made known also to the Regional Boards and Boards of Governors for the hospital service, to the Executive Councils for the general practitioner services, and to any voluntary organization which to the local authority's knowledge is working in the same field in their area.

75. The purpose of this last requirement is to ensure that these local arrangements are fitted appropriately to the hospital and specialist services for which the Minister is more directly responsible and to the general practitioner services which will be operated within his general regulations and control. This inter-relation between the different arms of the health service is reinforced by the provision (already mentioned) for the local health authorities to nominate one-third of the members of the Executive Councils for the general practitioner services and to be consulted by the Minister in the appointment of Regional Boards, Management Committees and Boards of Governors in the hospital and specialist services.

76. It will also be reinforced in the ordinary process of administration by the personal contacts of the local Medical Officers of Health and the principal medical and other officers of the other bodies, and by various practical devices such as the establishment of local co-ordinating committees of medical and other officers and by the use, wherever feasible, of common employment by different bodies of the same part-time medical or other staff.

77. The various functions comprised in the local government part of the health service are summarized below.

Maternity and Child Welfare and Midwifery.

78. The Bill makes it the duty of every local health authority to make arrangements for the care of expectant and nursing mothers and of children under five years of age who are not attending school and who are therefore not covered by the school health service. Their arrangements will include ante-natal clinics for the care of expectant mothers, post-natal and child clinics, the provision of such things as cod-liver oil, fruit juices and other dietary supplements and, in particular, a priority dental service for expectant and nursing mothers and young children.

79. The Bill transfers these functions from such of the present "minor" authorities—the non-county boroughs and the district councils—as are at present exercising them. But, for co-ordination with the school health services, provision is made for delegating child welfare to "district executives" in the same way—and with the same rights for the minor authorities—as is done for the school health service under the Education Act, 1944.

80. The same authorities—county and county borough councils—are also made the supervising authorities for the purposes of the existing Midwives Acts; that is to say, they are made responsible for a complete midwifery service for mothers who are confined at home. The midwives are to be employed either by the local health authority itself or by voluntary organizations with whom the authority comes to an appropriate arrangement. Attendance at the confinement is not to be made the general duty of the doctor within the general medical practitioner service, but the midwife will have the usual right—and duty—to call in a suitably qualified doctor in case of need. The general practitioner's services will nevertheless be available to the ordinary extent of general advice and health care to a woman before and after confinement as at any other time.

81. Mothers who for any reason have their confinements in a hospital or maternity home will be in the care of the hospital and specialist service. It will also be the object of that service to provide locally for all specialist obstetric or gynæcological care which may be needed in relation to the ordinary domiciliary service of the local authority. The requirement of Ministerial approval to the local authority's arrangements will link together the two aspects of the maternity service—domiciliary and institutional.

Health Visiting and Home Nursing.

82. It is made the duty of the local health authority to provide for a full health visitor service for all in their area who are sick, or expectant mothers, or those with the care of young children. This widens the present conception of health visiting (as concerned with mothers and children) into a more general service of advice to households where there is sickness or where help of a preventive character may be needed.

83. It is also made the duty of the local health authority to provide a home nursing service for those who—for good reason—need nursing in their own homes.

84. In both of these activities the local authority can, if it likes and if the Minister approves, make all or part of its provision by arrangement with voluntary organizations to act on its behalf.

Local Mental Health Services.

85. The main mental treatment and mental deficiency services are to be part of the new hospital and specialist arrangements under the Bill. Local health authorities, however, are given responsibility for all the ordinary local community care in the mental health service—that is to say, the ascertainment of mental defectives and their supervision when they are living in the community. This part of the service covers also the initial proceedings for placing under care those who require treatment under the Lunacy and Mental Treatment Acts.

Vaccination and Immunization.

86. Compulsory vaccination is to be abolished by the Bill, but it is to be the duty of the local health authority to provide free vaccination and diphtheria immunization for anyone who desires them. This service the authority will provide by making arrangements with doctors who are taking part in the general practitioner service—paying appropriate fees to those who undertake it. The vaccines, sera or other preparations required may be supplied without

charge by the Minister to local health authorities and doctors and the service may, if circumstances demand, be extended to cover vaccination and immunization against other diseases beside smallpox and diphtheria.

Ambulance Service.

87. Apart from vehicles which may need to be provided as part of the hospital service, the provision of the main ambulances and hospital transport required for the health service becomes the duty of the local health authorities, either directly or by arrangement with voluntary organizations. In future the local health authority's ambulances may—and must, if necessary—operate outside their own area.

Care and After-Care of the Sick.

88. Local health authorities are given a new power, and duty where the Minister so requires, to make approved arrangements for the purpose of the prevention of illness and the care and after-care of the sick. This can include such things as the provision of special foods, blankets, extra comforts and special accommodation for invalids and convalescents and the making of grants to voluntary organizations doing work of this kind (but it expressly does not include cash allowances to individuals or families, which is the function of National Insurance). A charge may be made in appropriate cases.

Domestic Help.

89. Under the existing law local authorities are empowered to provide home helps as part of their maternity and child welfare functions and, during the war, this power has been extended by temporary enactments to enable them to provide domestic help in a wider range of circumstances. The Bill makes this power permanent and extends it to cover the provision of domestic help, subject to the Minister's approval, to any household in which it is needed on grounds of ill-health, maternity, age or the welfare of children. The local health authority will be allowed to make appropriate charge for this service.

Health Centres.

90. The duty of the local health authorities to provide and maintain general Health Centres, both for their own activities and for the general practitioner services, has already been described.

Health Committees.

91. Local health authorities will, in the future, be required to appoint statutory health committees (comparable in many ways to their statutory Education Committees) and to refer to them all matters relating to the discharge of their functions under the Bill. The health committees may be authorized to exercise functions on behalf of their parent authorities and there is discretion to appoint by cooption expert members who are not members of the authority itself.

General Administrative and Financial Provisions.

Central Health Services Council.

92. In paragraph 10 the setting up of new technical advisory machinery by the Minister's side has been mentioned. In more detail, the arrangements are these. To advise him generally on the administration of the health service the Minister is to have beside him a Central Health Services Council. The members are to be doctors, dentists, nurses and other professional people concerned with the different parts of the service, together with people having experience of hospital management, of local government and of mental health services—all of them appointed by the Minister in their individual capacities, but after consultation with the appropriate representative organizations. The Presidents or Chairmen of six of the principal medical bodies in the country are also to serve on the Council, ex officio.

93. The new Central Council will be free to advise the Minister of its own initiative on any expert aspect of the services, as well as on matters expressly referred to it by him. It will report annually to the Minister, who will lay the report before Parliament—with his own comments, if he wishes—unless he is satisfied that it would be contrary to the public interest to publish the report or any part of it.

94. The Minister is empowered also to constitute various Standing Advisory Committees on different technical aspects of the new service. These Committees are not specified in the Bill. They will in fact deal with medical aspects of the service, mental health, dentistry, nursing, pharmacy, and any other matters justifying special advisory machinery. They will deal with questions referred to them either by the Minister or by the Central Council and will have direct access to the Minister as well as to the Council.

Default Powers of Minister.

95. The Minister is given default powers against local health authorities and any of the bodies constituted by the Bill—the various hospital bodies, Executive Councils and others—if they are not carrying out their functions satisfactorily. He can make an order directing them to do whatever may be necessary and then, if still not satisfied, he may take over their functions, permanently or temporarily, himself.

Position of Officers.

96. Regulations made by the Minister may lay down the qualifications and conditions of service of any or all of the officers and employees of all bodies (including voluntary organizations) concerned with providing services under the Bill. In regulating conditions of service or remuneration, it will be his object—as already stated—to use appropriate machinery of discussion and negotiation with representatives of those affected.

97. The Minister is empowered to establish contributory superannuation arrangements for the staffs of hospitals (including the specialist services), Executive Councils, the bacteriological and blood transfusion services, and doctors and dentists in the general practitioner services. The employees of local health authorities will be entitled to the benefits of the existing local government superannuation scheme, which can be modified by regulations under the Bill for staff in the health services in order to secure the maximum of interchangeability with other parts of the general service. The employees of local voluntary organizations can be brought within local superannuation schemes. The general object will be to make arrangements such as will secure freedom of movement between the central and local services, and within these services, and also between services provided under the Bill and other health services.

98. Protection is given to existing officers of voluntary hospitals, Insurance Committees and local authorities whose functions are transferred or extinguished by the Bill, by providing for their transfer and re-employment by the appropriate authority under the new service or for their compensation if they were previously employed whole-time and suffer loss as a result of the change-over.

Miscellaneous.

99. The Bill contains also a number of miscellaneous provisions relating to such matters as the transfer of the property of local authorities and Insurance Committees, the holding of inquiries, the procedure for making regulations and orders, and the repeal or adaption of the existing law to fit the new conditions.

Finance.

100. The new service is to be financed mainly from the exchequer, assisted by a payment of some £32 millions transferred from the National Insurance Fund, and partly from local rates with the help of exchequer grant.

101. The exchequer will bear the cost of the hospital, specialist and other centrally organized services, the cost of the family practitioner services, half the cost of the local health authority services, together with the cost of central administration. The rates will bear half of the cost of the local health authority services previously described.

102. The expenditure of local health authorities on their services—including any payments which they make to voluntary organizations for services on their behalf—is to rank for exchequer grant, calculated in accordance with regulations to be made under the Bill. The grant is to be on a "weighted" 50% basis, with no local health authority receiving more than three-quarters or less than three-eighths of their expenditure.

103. The transfer of the cost of the local authority hospital services from the ratepayers to the taxpayers (together with other changes which are in contemplation outside the scope of this Bill) must profoundly affect the present financial relations between the exchequer and local authorities. The primary financial effect of the transfer of hospital services from local authorities will be to benefit the richer areas appreciably more, generally speaking, than the poorer areas. Radical changes will be necessary in the general scheme of exchequer grants in aid of local authorities, therefore, to secure that over-all the policy of the Government of concentrating those grants as far as possible where the need is greatest is further developed. The whole of this question is at present under consideration by the Government with a view to the introduction of a reformed scheme by the time the new health service comes into actual operation.

104. The financial memorandum attached to the Bill itself gives details of the general financial background of the new proposals.

British Medical Association News.

NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioners have been released from full-time duty with His Majesty's Forces and will resume, or have resumed, civil practice as from the dates mentioned:

Dr. J. C. Balzer, 135, Macquarie Street, Sydney (April 1, 1946).
Dr. J. F. Ireland, Gipps Street, Bega, New South Wales (April 1, 1946).
Dr. W. K. Myers, 135, Macquarie Street, Sydney (March 5, 1946).
Dr. I. A. Brodziak, 231, Macquarie Street, Sydney (January 2, 1946).
Dr. D. Varvaressos, 217, Macquarie Street, Sydney (April 18, 1946).
Dr. R. E. Wherrett, 854, Victoria Road, Ryde, New South Wales (April 30, 1946).
Dr. E. A. F. McDonald, Oakey, Queensland (March 25, 1946).
Dr. T. K. Wilson, Waterworks Road, Ashgrove, Brisbane (March 4, 1946).
Dr. S. D. Meares, 185, Macquarie Street, Sydney (April 6, 1946).

Medical Societies.

OBSTETRICAL SOCIETY OF THE WOMEN'S HOSPITAL, MELBOURNE.

A MEETING of the Obstetrical Society of the Women's Hospital, Melbourne, was held on August 15, 1945, DR. A. M. WILSON in the chair.

POSTERIOR POSITION OF THE OCCIPUT.

The meeting took the form of a discussion on posterior positions of the occiput.

Points in Statistics and Ætiology.

DR. GEORGE SIMPSON said that the problem of posterior positions of the occiput had immediately presented itself when it was decided to discuss some common obstetric abnormality. In spite of its frequency, it was an abnormality easily forgotten till the baby "popped out P.O.P.", with embarrassment to the obstetrician only, or until delayed labour in an expectedly normal case forced investigation, or a low forceps application resulted in a deep or complete tear or failed to effect delivery because of an unrotated head. Labour with the occiput in the posterior position was often normal; but delay or obstruction might occur as a direct result of it. Dr. Simpson said that the unfixed head generally lay in the transverse diameter. When it engaged, it might do so in the transverse diameter or in one of the oblique diameters. Caldwell and Moloy stated that 64% of unfixed heads engaged in the transverse diameter, 16% in the occipito-posterior position, and 20% in the occipito-anterior position. Of heads lying in the transverse diameter, 1% became fixed in the posterior position. Dr. Simpson said that during labour, labour commencing with the occiput in the posterior position might proceed in various ways. (i) Long rotation of the occiput to the anterior position might occur and normal spontaneous delivery follow. (ii) Anterior rotation might occur, but the patient might not be able to deliver herself, and delivery by forceps might be necessary. (iii) Anterior rotation might be incomplete; the head might be held up in the transverse diameter in the pelvis (deep transverse arrest). Manual rotation might be necessary, after which delivery might be effected by forceps. (iv) Short rotation of the occiput posteriorly might occur, and delivery might take place spontaneously with face to pubis. (v) After short rotation into the posterior or sacral position delay might occur, and delivery by forceps might be effected without rotation with the fœtus in the occipito-posterior position or after manual rotation to the anterior position. (vi) Cæsarean section or internal version might be undertaken to ensure a living child; or when the fœtus was already dead, embryotomy might be performed to ensure minimal maternal damage.

Dr. Simpson then presented statistics of cases at the Women's Hospital, Melbourne, during the period of five years from 1939 to 1944, which showed the frequency of occipito-posterior position to be about 18% of all vertex presentations (3,078 in 17,297 cases). In a corresponding number of cases at Queen Charlotte's Hospital, London, from 1908 to 1917, the percentage of posterior presentations was 18·1. Dr. Simpson found that in 71% of the cases spontaneous anterior rotation took place, in 20% spontaneous posterior rotation occurred, and in 9% manual rotation was performed. The maternal and fœtal mortality rates were low when spontaneous anterior rotation occurred. The forceps delivery rate was 9%, which was little above the hospital rate of 8·7% for all cases. The duration of labour in these cases was also not excessive, and labour could not be regarded as abnormal. When manual rotation was necessary, mortality rates, both fœtal and maternal, were higher, and in cases of persistent occipito-posterior position the fœtal mortality rate was considerable, being 50% in the cases reviewed. The forceps delivery rate when spontaneous anterior rotation did not occur was 31%, and the total rate in all cases of occipito-posterior presentation was 16%. The fœtal mortality rate in all cases of occipito-posterior presentation was 5·2%, whereas the total fœtal mortality rate for all cases in the same period was 7·8%. At the Women's Hospital, Melbourne, during the period of five years from 1939 to 1944, vertex presentations numbered 17,297; occipito-anterior presentations numbered 14,219, 60% of the infants presenting in the left occipito-anterior position; occipito-posterior presentations numbered 3,078 (17·8%); 58% of the infants presented in the right occipito-posterior position. At Queen Charlotte's Hospital, London, from 1908 to 1917, there were 17,322 vertex presentations, 3,147, or 18·1%, being occipito-posterior presentations. Caldwell and Moloy recorded 64% of transverse presentations, 16% of posterior presentations and 20% of anterior presentations.

TABLE I.

Type of Labour.	Cases.	Mortality Rate. (Percentage.)	
		Fœtal.	Maternal.
Spontaneous anterior rotation and delivery	2,000	2·0	0·05
Spontaneous rotation, application of forceps	203	6·0	0·5
Manual rotation, application of forceps	249	8·0	1·2
Spontaneous delivery as occipito-posterior presentation	604	12·0	0·3
Forceps delivery as occipito-posterior presentation	22	50·0	Nil

TABLE II.

Duration of Labour with Occiput in Posterior Position; 1941 to 1942, 633 Cases.

Type of Delivery.	Primiparæ (249).		Multiparæ (384).	
	Number of Cases.	Duration. (Hours.)	Number of Cases.	Duration. (Hours.)
Spontaneous delivery, anterior	151	18·0	262	11·5
Spontaneous delivery, posterior	31	18·0	89	11·5
Forceps delivery	30	30·0	15	15·5
Manual rotation and application of forceps	37	33·5	18	16·0

Dr. Simpson next dealt with the question of diagnosis. He said that the diagnosis of the posterior position of the occiput was established by routine clinical examination and investigation. (i) On inspection, the contour of the abdomen was flatter in the umbilical region. (ii) On palpation, the absence of convexity of the back and the presence of the limbs in front were noted. In a normal-sized pelvis the head might not be engaged. Deflexion of the head and prominence of the forehead might be noted. The anterior shoulder was further out from the mid-line than the half-inch found when the occiput was in the anterior position. (iii) On auscultation the fœtal heart beat was heard out towards the loin and might be on the opposite side. (iv) X-ray examination made the diagnosis certain. (v) On vaginal examination, when the os was dilated, it was possible to make the diagnosis by identification of suture lines and fontanelles. These features might be obscured by the caput

and by moulding. If the head was deflexed the anterior fontanelle might be reached. Palpation of the ears and of the neck might establish the diagnosis. The induction of anæsthesia and the use of the whole hand might be necessary. (vi) The progress of labour was another indication. In the majority of cases of occipito-posterior presentations the position was right occipito-posterior, so occipito-posterior presentation should be thought of when the back was to the right. Early rupture of the membranes was likely in occipito-posterior presentations. The character of the pains might give an indication of the condition. Abnormal pains suggested abnormal labour. Primary uterine inertia might ensue, and the contractions might not become normal till the head had rotated. Professor Windeyer had shown how the progress of the anterior shoulder might be followed during labour, and so anterior or posterior rotation might be diagnosed. As a result of the occipito-posterior position delay or obstruction might occur at the brim, in the pelvis or on the pelvic floor or perineum. It might be because of delay that investigation was called for. Posterior position of the occiput was one of the first conditions to be thought of. When the head reached the perineum there was unusual bulging, and anal dilatation was excessive. As delivery occurred there was great stretching of the vulva, and deep tears might result. On application of forceps, if the condition had not been diagnosed, it might be found that the forceps would not lock properly. When strong traction was applied they might slip off. When the head was pulled down onto the perineum, wide bulging of the posterior portion of the perineum was noted. Failure to effect delivery after greater or lesser effort might lead to review of the condition and establishment of the correct diagnosis. In conclusion, Dr. Simpson said that though the features on which the diagnosis depended were so many, the condition was often missed, or diagnosis was established only at the eleventh hour. Often the condition was not thought of, often when diligently looked for it was missed. It was most important, however, to be certain, for the chief danger in persistent occipito-posterior position was failure to make an early diagnosis.

Some Points in the Ætiology and Mechanism of Occipito-Posterior Positions.

DR. J. W. JOHNSTONE said that the fœtus usually disposed itself in a longitudinal lie with the head lowermost and in an attitude approximating to universal flexion. The presenting part over the brim was thus the vertex, and if the occiput was taken as the denominating point it was possible to spin the fœtus round its vertical axis to produce just as many positions as there were degrees in a circle. If the mother's abdominal cavity was geometrically symmetrical around this axis, the fœtus would take up any of these positions at random. If the body was even bilaterally symmetrical, the incidence of the right and left positions would be equal. Academically, it was the custom to divide the brim into four quadrants, and to define the four vertex positions accordingly as the occiput lay to the right or left of the sagittal plane, and in front or behind the coronal plane. The smooth forward curvature of the mother's anterior abdominal wall at once accommodated more readily the fœtal back and favoured the anterior positions. In the fewer cases in which the fœtal back was behind, it tended to be extended by the projection forwards of the opposing lumbar part of the maternal spine. This projection forwards also pushed the fœtal torso to one side and thus accommodated it more conveniently in the oblique diameters. Furthermore, the general symmetry of the abdominal cavity was unbalanced by a number of factors, amongst which were the liver mass, the rectum and the pelvic part of the colon, the right lateral obliquity of the uterus, and the forward torsion of its left cornu. In addition, the majority of women were right-handed and stamped down more heavily on the right foot than on the left. When the fœtus was freely mobile above the brim the body tended to control the head, but with descent and engagement the shape of the pelvic brim became a major factor in guiding the head into its appropriate diameter. It was to be remembered that the head, as well as being hinged onto the body at the neck, was allowed also some lateral inclination and rotary torsion.

Dr. Johnstone then discussed the mechanism of presentation of the head under three headings: (i) engagement, (ii) transit and rotation, (iii) disengagement. Referring first to engagement, Dr. Johnstone said that on the basis of abdominal palpation of the torso, it was the usual teaching to accept the fact that the head engaged in the oblique diameter and with the occiput posterior in about one-quarter of the cases. Recent X-ray studies before and during labour, by means of the more precise methods of stereo-radioscopy, had led to a revision of this preconceived academic teaching. The actual diameters of engagement of the head as it settled into the brim departed radically from the two geometrical obliques. It had been already pointed out by Dr. Simpson that a directly anterior or posterior presentation of the occiput was not uncommon, while in the majority of cases the head negotiated the brim approximately in the transverse diameter. Only very rarely did the occiput which engaged near the transverse diameter ever rotate to the back. Dr. Johnstone went on to say that during the transit of the head through the cavity three things could happen. First, the occiput could take the long rotation to the front, passing through the transverse diameter and the corresponding anterior position, to be delivered in the normal manner. Secondly, it could remain arrested at or behind the transverse diameter. Thirdly, it could be deflected to the back and perhaps delivered as a persistent occipito-posterior presentation. This internal rotation was the result of the interaction of the fœtal head against the curved birth canal. Just as in putting on a boot there was a tendency to turn the toes forward into the angle of the boot, so the fœtal occiput was rotated to accommodate the nape of the neck under the pubic angle in the birth canal. Extension of the head was a prime factor in posterior positions of the occiput in bringing the sinciput lowermost and thus deflecting the occiput to the sacrum. This extension also brought into engagement in the pelvis the occipito-frontal fœtal diameter of four and a half inches. As this was about the diameter of the normal transverse diameter of the cavity, there might be a mechanical barrier to forward rotation should the occiput have entered behind the transverse diameter. Particularly was this so when the pelvis was of the android funnel type, the lateral pelvic walls converging even more from the brim to the outlet. In this case the head was liable to remain high and unrotated. Dr. Johnstone then said that disengagement of the head from a persistent occipito-posterior presentation occurred first by the fixation of the root of the nose against the lower symphysis, the head thus being put into flexion and the distended perineum being allowed to slip over the occiput. The degree of flexion was determined by the amount of space in the bony outlet. When it was more than adequate back to front, flexion might be incomplete and the head might disengage almost as a brow presentation. Secondly, with the nape of the neck as a fixed point against the apex of the sacrum, extension occurred and the face was delivered from behind the pubis. Thus the head was disengaged first by flexion, and the disengagement was completed by extension. Dr. Johnstone said that it should be noted that the diameter of engagement in the outlet was the occipito-frontal four and a half inches, instead of the sub-occipito-bregmatic three and three-quarter inches. Likewise the available space in the outlet was determined by the three fixed points—the apex of the sacrum and the two ischial tuberosities. Rarely was it found that a head was so large that it could not negotiate these three fixed points. Slight narrowing of the tuberosities, however, produced a backward displacement of the head, so that it had to bore back onto the rectum. In the delivery with forceps of a fœtus presenting persistently in the occipito-posterior position, there was a mechanical disadvantage in that the pull of the axis traction was directed forwards onto the pubis and tuberosities, and also that instead of allowing the primary movement of flexion to occur, it tended to pull the head into premature extension. This was one of the factors which accounted for the 12% fœtal mortality rate at the hospital in cases in which spontaneous delivery occurred in a persistent occipito-posterior position, and the 50% fœtal mortality rate when the delivery in such a position required forceps; this had already been pointed out by Dr. Simpson. Furthermore a common cause of "failed forceps" cases dealt with at the hospital was lack of recognition of the posterior position of the occiput.

Dr. Johnstone then said that he wished to draw attention to the anatomical variants of the normal pelvic conformity, which had been revealed by the newer methods of ante-natal radiology. Caldwell and Moloy classified pelves into the four parent types: anthropoid, platypelloid, gynæcoid and android. The points of importance in the android pelvis were not only the heart-shaped inlet with narrow hind pelvis and pointed forepelvis, but also the flattened, J-shaped sacrum and the acutely angulated great sacro-sciatic notch. If the pelvis was turned over, it could be seen that the important subpubic angle between the inferior ischio-pubic rami was pointed like a Gothic arch instead of rounded like a Roman arch, and the ischial spines were inturned into the lower cavity. It had been demonstrated that these variations of pelvic conformity exerted a considerable influence, not only on the primary diameter of engagement, but on the subsequent passage through the cavity. It was often supposed that if the true conjugate diameter was normal, so also

must all the other obstetric measurements be correspondingly adequate. But this was not so, and, moreover, the external measurements bore no constant relationship to the capacity of the true pelvis and might be the cause of serious misjudgement. While nobody would be so foolish as to give a forecast, in view of the many variable factors in labour, nevertheless it was possible to predict with some degree of accuracy the birth sequence for each pelvic pattern. In the gynæcoid type of pelvis, which constituted over 50%, the head would engage about the transverse diameter, but even if the occiput was behind, it would take the long rotation to the front and be delivered easily by the normal mechanism. In the rare platypelloid type of pelvis also—probably less than 1% in Australia—the head would enter in the transverse diameter, but once it was through the main difficult passage at the brim, there was likely to be no further trouble. The anthropoid pelvis, with back-to-front elliptical shape, tended to dispose the head in the sagittal diameter, sometimes with the occiput directly back or front. When the outlet likewise was adequate in the sagittal plane, the directly posterior occiput might often best be delivered in that position, either spontaneously by the patient's own effort or by operative assistance. Dr. Johnstone said that it was in the android type of pelvis—about 20% of pelves in Australia—that the greatest difficulty was met. These were the old funnel pelves with sloping pelvic walls, prominent spines and inturned sacrum. Should the head enter behind the transverse diameter, as it was wont to do, then it often remained high in a position of transverse arrest above the ischial spine plane.

Dr. Johnstone then drew attention to the relationship between the pelvic type and general physical characteristics and body habitus. Many of the workers agreed that the possessors of the ape-like anthropoid pelvis were predominantly tall, long-headed, wide-shouldered, with narrow flanks and long slender limbs. Caldwell and Moloy suggested that this was a primitive pelvic type undergoing evolution to the flat form in the higher races of mankind. This was in spite of the fact that pelves of this type were more commonly to be found in the well-nourished, privileged and professional classes than in others. As might be expected, the small group with the flattened platypelloid pelvis tended to be of short stature. Women with the well-rounded gynæcoid pelvis were noted for their characteristically feminine appearance. This type of pelvis was associated with narrow sloping shoulders, slender waist, and hips rounded from waist to knee; these women stood well on neat legs falling away to slim ankles. Besides their æsthetic attraction, these plump, well-shaped women were noted for their natural fecundity. In labour they tended to preserve the true academic mechanism. With regard to the large and interesting group of women with android pelves, it could be said that, apart from the shape of the pelvis and perhaps the outline of the pubic hair, they were by no means masculine in the ordinary sense. They were highly coloured and short-necked, with a long, square, heavy torso and a tendency to loose obesity. The limbs were short, the thighs running straight down to thick ankles. The pelvic joints were rigid and the genitalia were often under-developed and inelastic. Amongst other interesting peculiarities they inclined to menstrual irregularity and to sexual apathy. They conceived infrequently and often late in life, and were many times more liable to the toxæmias, to abortion and to spasmodic dysmenorrhœa than were women of other types. In labour they "went overtime" and often had premature rupture of the membranes with inertia; often there was a posterior position of the fœtus tending to impaction. In short, they often had what had been called the dystrophia-dystocia syndrome. Perhaps it was not that they had too much male sex hormone, but that they had not enough female œstrogens to divaricate far enough from the neutral eunuchoid type. In conclusion, Dr. Johnstone said that he wished to make it clear that the relationship between pelvic shape and general physical characteristics was very loose. He did not wish it to be inferred that it was the custom of the hospital to practise or necessarily to recommend as a routine measure radiological examination before labour. Even if that was done, they would be forearmed with only one factor in the complex mechanism of a labour.

The Management of the Occipito-Posterior Presentation.

Dr. W. Ivon Hayes said that delay, difficulty and danger to both mother and child attended one-third of labours complicated by the presence of a posterior position of the occiput. It was, therefore, necessary to watch the labour carefully in those cases in which the occiput either was or became directed posteriorly, in order to distinguish between those labours that progressed normally from those in which delay occurred. The former were normal labours and required no special management; but a happy outcome in the latter type depended to a great extent on the intelligent observation, and when indicated the timely intervention, of the attendant. Discussing management before labour, Dr. Hayes said that Buisst's method of correcting a posterior position by means of abdominal pads and binder had undeservedly fallen into disfavour; but his own experience had shown it to be often effective when rectification was most desirable. In the case of the *primipara* at the end of pregnancy, when the fœtal occiput was unfixed in the posterior position, suggesting disproportion because of the deflexion, the head usually became fixed in an anterior position after this treatment. When the head was fixed in a posterior position, Buisst's pads were ineffective, and in *multiparæ* their use was not strongly indicated.

Referring to management during labour, Dr. Hayes said that when delay occurred during labour, it usually did so at certain sites and for certain special reasons. It was proposed, therefore, to discuss the management according to the station or level of the head at which the difficulty took place. When delay occurred early in labour, the head was incompletely flexed and remained unfixed with the occiput directed posteriorly. Primary uterine inertia was common, and the possibility of disproportion sufficient to justify Cæsarean section should be kept in mind. The patient was reassured, her strength was supported by suitable nourishment, and a mild sedative such as chloral hydrate and potassium bromide was administered to assist her to go through what promised to be a long labour. A tight abdominal binder and the effect of gravity, as invoked by sitting or standing, were helpful in promoting engagement of the head. Fixation, followed by slow and continuous descent, eliminated the possibility of insuperable disproportion, and vaginal delivery could then be expected with confidence. When delay occurred towards the end of the first stage of labour, deflexion of the head often caused an arrest when the cervix was not fully dilated. The brow of the child was still palpable abdominally; the cervix, with perhaps some thickening, remained about three-quarters dilated, flexion was deficient, as could be shown by the relative positions of the two fontanelles, while the occiput was posterior. Manual rectification under general anæsthesia to an anterior position was indicated, and was carried out by gently pushing up the head vaginally, and then passing the hand behind the head up to the posterior shoulder, which was brought across the mid-line. The other hand could be used externally to push the anterior shoulder in the opposite direction. When the shoulders were brought into the opposite oblique diameter of the pelvis, the head, with the occiput leading, was steered down into its new position by the internal hand, and the patient was allowed to continue in labour. If much moulding had taken place, time was required for alteration of the head to suit the new position. When the head passed through the fully dilated cervix and came to occupy the pelvic cavity, delay might be caused by its failure to rotate from the posterior position, by partial rotation to the position of "deep transverse arrest", or by adverse rotation of the occiput to the sacrum. In each case the head was deflexed. The treatment of these three conditions was by manual rotation, the application of forceps and delivery. That hand, the palm of which faced the occiput, was passed up and disengaged the head gently, and then the head was flexed as much as possible by pulling down the occiput with the fingers and pushing up the forehead with the thumb. With the same grip, the head was now rotated to bring the occiput to the front, and the forceps were applied, the posterior blade being preferably applied first. When the occiput was in the sacral cavity, it was rotated toward the side from which it originally came, if this was known. If it was impossible to hold the head until the forceps were applied, moderate pressure on the fundus might be helpful to immobilize it; but if this also failed, the head should be pushed out of the pelvis and rotated by the shoulders in the manner already described. In cases in which there was a transverse contraction of the pelvic outlet, it was probably safer to avoid rotating a head in the occipito-posterior or occipito-sacral position, and to deliver the child with forceps in the face-to-pubes position, after performing a deep episiotomy.

Dr. Hayes went on to say that delay with the head on the perineum in an occipito-sacral position at this situation was the result of a resistant perineum and of the inability of the flexed head in the occipito-sacral position to flex sufficiently far to pass forward under the pubic angle. The head was usually visible, but did not progress. The treatment was to deliver the fœtus with forceps in the posterior position, assisting the natural mechanism and using a deep episiotomy.

Dr. Hayes thought that rotation with forceps in occipito-posterior presentations should be reserved for the expert. An expert he defined as one who could make an exact diagnosis of the position, the station and the attitude of the head; one who held the forceps at its point of balance just beyond the handle, as he would hold a pen, a scalpel or a catheter; and one who could, after introducing the tip of the blade into the vulva, attain a true cephalic application over the ears, literally with his eyes shut, and without any sign of hæmorrhage indicating vaginal injury. He was also one who realized the reason for the arrow on the tractor, and was guided by its direction. Finally, he realized the importance of delivering the fœtus slowly by imitating the intermittent pains of labour and appreciating the brutal strength of the instrument when improperly used. When the cervix was incompletely dilated, rotation with forceps must never be attempted, for pure rotation was unattainable, and immediate extraction was contraindicated, because of possible injury to the cervix. Manual rotation of the shoulders was then the correct treatment. When the cervix was completely dilated, and the head engaged—at or below the level of the ischial spines—and an indication was present, forceps might be used for rotation and subsequent delivery. Flexion of the head was first increased by manipulation, and then the blades were applied over the ears, but with the pelvic concavity of the forceps directed towards the forehead; the position of the forceps in the pelvis was the same in right occipito-posterior and left occipito-anterior presentations. After the forceps were locked, the head was slightly disengaged, and the tractor then lined up with the arrow indicator. Rotation was now gently attempted by pressure on the end of the handles with one finger, so as to make it describe an arc in the required direction round the axis tractor as centre. If rotation proved difficult, the head was slightly and gently pushed up from time to time as the occiput was brought forward. Another method of rotation was to place the straightened index finger between the shanks just beyond the handles, and using this as a lever, rotate in the proper direction. On no account must the handles be grasped and used to perform rotation. When the occiput had been brought in front of the transverse diameter, into an anterior position, the head was brought down further than before, the forceps were removed and reapplied as in the ordinary anterior position, and delivery was completed, the shape of the pelvic outlet aiding rotation, or assistance being given in the manner already described. When the head was impacted low down in the pelvis, a slightly different method could be used, which more closely resembled the natural mechanism. The forceps were applied as before, and traction was made in the correct direction by the tractor; but while this was being done, rotation was attempted by the finger between the shanks. When the head was almost out of the bony pelvis, and was surrounded almost entirely by the soft parts of the vulva, rotation would be found easy, but no force should be used. If the head would not rotate, it was because it was not yet low enough for rotation to take place, so it had to be drawn down still further. The effect of this method was thus to impart a corkscrew motion to the head, descent and rotation taking place at the same time. When the head took up the position of "deep transverse arrest", forceps might be applied; but in this instance as near a cephalic application as possible should be made. One blade was placed over the anterior frontal bone and the other over the posterior parietal eminence. The forceps would not snugly close, as an abnormal diameter was between the blades, and rotation was carried out with the greatest care on account of the increased possibility of injury. The occipito-posterior positions which caused trouble demanded of the physician a deep understanding of labour, a complete knowledge of the abnormal mechanics and mechanism involved, and when interference was necessary, great gentleness and a profound respect for the fœtal brain and the maternal soft parts.

Discussion.

DR. W. D. SALTAU said that, according to statistics given by Munro Kerr and Whitridge Williams, in only 3% of posterior positions of the occiput did the head fail to rotate. Aids to the diagnosis of a posterior position were the position of the fœtal heart and gaping of the vulva when the head was approaching the perineum. Dr. Saltau found heads in the persistent occipito-posterior position easier to rotate than heads that were arrested in the deep transvere position. He usually rotated the latter manually, but occasionally found it necessary to apply the forceps cephalically and then rotate the head. The position of the patient was important; in a right occipito-posterior presentation Sims's position aided the rotation by gravity. In left occipito-posterior presentations the lithotomy position made it easier to bring the shoulder across. This manœuvre was better performed from the outside. Dr. Saltau had had little experience of the Scanzoni manœuvre, and no experience of Kelland's forceps.

DR. M. A. MACKIE considered that the high mortality rate at the Women's Hospital for forceps delivery in persistent occipito-posterior presentations needed explanation. There were only 22 cases; all the babies were delivered as persistent occipito-posterior presentations after attempted manual rotation, and therefore in the presence of considerable disproportion and after long labours, or if the diagnosis had been overlooked. Only in those cases of persistent occipito-posterior presentation in which urgent fœtal distress was present was delivery effected without an attempt at manual rotation.

DR. A. S. FEDDERSEN asked whether it was justifiable to deliver the fœtus in a persistent occipito-posterior position when there was difficulty in manual rotation.

DR. G. MORRISON said that he found difficulty in being certain of the diagnosis of a posterior position, and he felt that the bigger the child, the more important was this position and the greater the difficulty in diagnosis. He asked whether a certain roominess in the hollow of the sacrum was characteristic of the posterior position of the occiput.

DR. W. J. RAWLINGS said that he was of the opinion that anæsthesia to the surgical degree was a necessity; otherwise the obstetrician found himself struggling against the uterus and not the fœtus. He also commended the lithotomy position instead of the lateral position, and he had been favourably impressed by the use of Kelland's forceps in positions of transverse arrest.

DR. F. HAYDEN said that he had arrived too late to hear the opinion regarding Buisst's pads; but it was his opinion that they were ineffective, and their use was something which had been handed down from one to the other. In the majority of posterior positions the occiput rotated to the front, and he doubted whether a critical analysis would show that the pads had any added effect. In Dr. Hayden's opinion the pads and binder only made the patient thoroughly uncomfortable.

DR. ARTHUR WILSON considered that the whole question of birth was purely a question of mechanics. He said that the relation of the size of the fœtus to the mother's pelvis, the presentation, the position, and the time at which the membranes ruptured, together with the mouldability of the head and the dilatability of the cervix and the soft parts, all operated in any maternity case. If most of these were favourable, delivery was satisfactory. A good obstetrician, if some of these were unfavourable, would produce a satisfactory result; but if most of them were unfavourable, vaginal delivery was hazardous and might result in loss of the baby. In the making of a prognosis for future pregnancies, it was important not to say that vaginal delivery was impossible, as conditions might be more favourable in the next pregnancy. Dr. Wilson said that he did not early rotate the occiput in a posterior position, but allowed labour to go on as long as progress was being made, and then interfered. Good anæsthesia was essential, as it was in manual removal and internal version. The main difficulty in the posterior position of the occiput arose before the second stage, particularly when deep transverse arrest of the head occurred. Labour would fail to progress and the condition might pass unrecognized. Close observation of the fœtal heart was essential. Dr. Wilson delivered in that position the head persistently presenting in the occipito-posterior position when it was on the perineum. Heads which were arrested in the deep transverse diameter he rotated with forceps if they were in a left position and manually rotated if they were in a right position. He always applied the forceps cephalically and never with forceps rotated the head through more than 90°. Dr. Wilson rarely made a pelvic examination, but he considered it helpful if labour failed to progress, and if necessary he used the whole hand and general anæsthesia. When forceps had been applied and a hard pull was necessary, it was better to reexamine the position before further traction was used.

DR. A. WYNN asked Dr. Wilson what he did when he found the fœtus becoming distressed, but yet the cervix was not fully dilated.

Dr. Wilson, in reply, said that delivery with forceps was indicated in such cases. It was better to have a live baby and a torn cervix than a dead baby and an intact cervix. In hospital practice it might be an obstetric triumph to deliver the patient intact; but in private practice a dead baby was looked upon by the patients as a complete failure.

DR. R. SOUTHBY asked what was considered the less risky procedure for the baby—wasting time by trying to rotate the head, or delivering it in the occipito-posterior position if

it was persistently so presenting. He cited a case in which the fœtus and mother were becoming distressed, and likewise the nursing staff, and in which the head seemed high and contractions were strong, in spite of the use of sedatives. The question of Cæsarean section had even entered his mind. He learned that almost as soon as the patient was sent to the Women's Hospital she had had a spontaneous rapid delivery. He asked Dr. Hayes what was to be the guide in such cases.

Dr. I. Buzzard asked what treatment was indicated when contractions were poor and the occiput was in the posterior position.

Dr. W. Ivon Hayes, in reply, said that he considered that Buisst's pads were effective only in *primigravidæ* in whom the fœtal head was unfixed and disproportion due to deflexion and projection forwards of the forehead was present. Usually the occiput became anterior and the head fixed after the use of Buisst's pads and a tight binder for twenty-four to forty-eight hours. These pads were of no use in labour. Dr. Hayes did not rotate an occiput in the posterior position by pushing the anterior shoulder vaginally, but by pushing the posterior shoulder. He considered that Kelland's forceps were of value only in deep transverse arrest of the head. He aimed at a cephalic application of Neville Barnes forceps, but realized that this was sometimes impossible. Dr. Hayes knew little of radiological pelvimetry, but he felt that knowledge of the shape of the pelvis was helpful. The advantage of the lithotomy position was in ease of orientation. An extreme lithotomy position produced enlargement of the outlet. X-ray examination did not confirm Walcher's view that the reverse was also true. With reference to delivery of a fœtus in the persistent occipito-posterior position, the easy thing was the right thing in most cases. A deep episiotomy was necessary if the baby was delivered in that position. If the head was high, it should be pushed up and rotated with the shoulders. If the head was low, it should be delivered without rotation. Dr. Hayes advised pelvic examination with the half or whole hand, and suggested that palpation of the nape of the neck or the orbital ridges was of assistance in identifying position.

Correspondence.

WOUNDS CAUSED BY SMALL FISH.

Sir: With regard to injuries produced by the bullrout, as mentioned by Dr. Sweetman in your issue of March 9, 1946, this is fairly well known. It is a very common injury caused to bare-footed bathers in the lower reaches of the Barron River and its tributaries, and causes a regular crop of admissions to hospital annually.

The fish concerned is *Notesthes robusta*, belonging to the family Scorpænidæ, which includes also *Pterois volitans* (firefish or "butterfly cod"), an ornamental fish well known to keepers of aquaria and which produces a much less severe injury, the injury being caused by some preocular spines with poison glands attached. The fish was exhibited last month at a meeting of the Queensland Branch, when I delivered an address on injuries produced by plants and animals. In Cairns it has been confused with the dreaded stone fish, *Synanceja trachyna*, a marine species, which—fortunately very rarely—produces much more serious injury.

The injuries usually occur in fresh water streams with rocky, pebbly bottoms, and in turbid waters hiding the bottom of the river. Bathers have been advised to wear sand-shoes when bathing in such waters.

Yours, etc.,

52, Abbott Street, Cairns, North Queensland.
March 17, 1946.

H. Flecker.

ULCERS IN THE MOUTH: AN APPEAL FOR HELP.

Sir: Another aspect of the oral ulcer may be of interest. A patient of fifty-five years suffered constantly from painful ulcers of the mouth for five years, during which time infected teeth and tonsils were removed without improvement. A fractional test meal revealed achlorhydria, so she takes an acid mixture regularly.

Last November she required hospital treatment for deep sloughing ulcers of the *labia minora*. Blood tests, smears, biopsy of ulcer edge all excluded specific or tuberculous disease, malignancy and anæmia. Two weeks of local treatment showed very little improvement.

The mouth ulcers were troublesome at the same time. The patient then stated that the oral ulcers began when the periods ceased five years before. Empirically, she was given 20,000 units of "Œstrone" twice weekly for a fortnight. Within ten days the ulcers of the *labia minora* had practically healed and the oral ulcers lost all pain and finally disappeared. The patient was able to go home and continued with small doses of stilbœstrol tablets for several weeks. She is now well and grateful to be rid of her ailment.

Yours, etc.,

Stanthorpe, Queensland,
March 28, 1946.

Eileen M. Murphy.

POLITICS AND THE MEDICAL PROFESSION.

Sir: Dr. Pern in his letter to the journal of March 23, 1946, uses some strange expressions, and makes still more strange statements. When he says that in a fully socialized country "the government class then become a vast monopoly", he is quite incorrect, as in a socialist State it is the whole community that owns the means of production, administered by its elected representatives.

Further on he states: "The word 'capitalism' implicates [does he mean implies?] the capitalistic system of production, distribution and exchange, money and the gold standard. . . . The Soviet Union practises capitalism equally as the democracies."

There are three absurdities in this: a capitalist State may or may not use the gold standard; money is used by both capitalist and socialist states; and the Soviet Union does not practise capitalism. Dr. Pern seems to be quite ignorant of the fundamental difference between socialism and capitalism, which is that under the former the means of production are owned by the whole community and used for the benefit of all, and under the latter the means of production are owned by private individuals and used for their profit.

It would probably be quite useless to assure Dr. Pern that socialists all wish to see democracy fulfilled, so that every individual not only has an equal vote (he has not even got that yet in England), but also equal opportunity to develop and use his abilities to the full.

Dr. Dane in the same issue states that collectivism demands equal distribution of wealth; but it is obvious that on a collective farm, for example, it would probably be sensible to give the manager a larger share of the product than the stable-boy; it would still be a collective.

Obviously also he has not the remotest understanding of the difference between socialism and communism: the motto of a socialist society is "from each according to his ability, and to each according to his work", and to say that the motto of communist society, "from each according to his ability, and to each according to his needs", was found to be unworkable is grotesque nonsense. Of course, it has never been tried, as no one but an incredible fool could think of trying it until two absolutely essential conditions had been fulfilled: (*a*) that production is great enough to supply all the needs of every member of the community; (*b*) that the education of living in a socialist society has so developed the moral sense of the great majority of the people that they realize that they are "members one of another", or in different words, have become aristocrats as defined by Lord Tweedsmuir—"a man who gives more to the community than he takes from it".

I shall leave it to Dr. O'Day to explain to Dr. Dane those "mystic pomposities" which he finds it so hard to understand, although they are clear statements of simple ideas.

At a time when it is vitally important that our political thinking should be clear, it is a most dangerous deception to link communism and fascism as though they were the same thing, when on fundamental issues they are diametrically opposed—on their theory of the State; on racial theory; in their attitude to women, to the working class and to trade unions, and to peace and war. This false teaching serves to increase our misunderstanding and suspicion of the Soviet Union, and that makes it easier for our reactionaries to arouse resentment against the Soviet which could ultimately lead to war; and we know what that would mean for our children and our country.

Finally Dr. Dane refers to "methods of violence, such as has no analogy whatsoever with obstetrical practice either ancient or modern". No violence in obstetrics? What are cranioclasts, Bossi's dilators, perforators, and all the grisly

gadgets for dismembering a fœtus but instruments of the most extreme violence? As Dr. Dane is unclear in his thinking about one of his professional subjects, it is not surprising that he fails to understand even the most elementary principles of socialism and communism.

Yours, etc.,

Katoomba, New South Wales, March 30, 1946. E. P. DARK.

SPONDYLITIS ANKYLOPOIETICA.

SIR: A sufferer from spinal rheumatism since adolescence, I am impelled to associate myself with your correspondent, Dr. E. Haslett Frazer (THE MEDICAL JOURNAL OF AUSTRALIA, March 30, 1946), in congratulating Dr. L. J. A. Parr and Dr. Eva Shipton on their recent splendid article on *spondylitis ankylopoietica*. Dr. Frazer's helpful and well presented commentary I considered equally praiseworthy, written, as it seemingly was, from personal experience of this cursed complaint.

Not all cases of rheumatoid spondylitis proceed to the classical kyphosis and poker back, and I am convinced that in any large city there are many sufferers from the condition in a less advanced form, and for whom the severe radicular pain, spinal stiffness, and the disturbance of mental tranquillity which such exhausting attacks induce, make the working hours a veritable misery. As Dr. Frazer pertinently remarks, few medical men care a tinker's dam about the spinal "arthritic", all too frequently and obtusely dismissed as neurotic, though the disability can provide a source of jocular comment from otherwise kindly friends.

I know the therapeutic (as well as the diagnostic) discouragements of chronic fibrous and joint rheumatism, but that it is one of the largest sources of invalidism, or semi-invalidism, cannot be disputed, and I do sincerely trust that the pleas of Dr. Pye, Dr. Shipton and Dr. Frazer for the establishment of clinics, and the more intensive study of rheumatology in this country, have not fallen on inattentive eyes.

Long experience in the interpretation of vertebral radiograms has taught me the limitations of the Röntgen method in the diagnosis of sacro-iliac and intervertebral joint pathology, and I can sympathize with Dr. Frazer in his perplexity caused by three widely varying X-ray reports on the same sacro-iliac film; the range of the radiographically normal is notoriously wide and the intellectual honest radiologist is forced to regard this area with the same circumspection as the pulmonary linear markings, the hilar shadows and the appendiceal region. Nevertheless, I am sure much pathology in the sacro-iliac and intervertebral joints eludes radiographic detection except in an advanced stage.

Because many of the profession still appear to be uninformed thereon, it is well to stress, as do your authors and correspondent, the marked differences in incidence, ætiology, pathology, radiological appearances and symptomatology between the invariably disabling *spondylitis ankylopoietica* and the benign *spondylitis osteoarthritica*, often almost symptomless.

It is over a hundred years ago since the Ariosto of the North, Walter Scott, from his sick bed at Abbotsford, wrote feelingly of "that bitch of rheumatism", and perhaps it is not unfitting that due to Gilbert Scott—my old teacher of happy London Hospital memory—X-ray therapy holds out a modality which will make the cross of spinal rheumatism a little less heavy.

Yours, etc.,

Melbourne, April 5, 1946. "FROACH EILEAN".

Post-Graduate Work.

COURSE ON ANÆSTHESIA IN MELBOURNE.

THE Melbourne Permanent Post-Graduate Committee announces that classes for Part I, Diploma of Anæsthesia, will be instituted in Melbourne within the next few weeks. Those intending to undertake the course are asked to communicate with the Melbourne Permanent Post-Graduate Committee, College of Surgeons, Spring Street, C.1 (Telephone: JM 1547-8).

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

COURSE AT GEELONG.

THE Melbourne Permanent Post-Graduate Committee has arranged a course of lecture-demonstrations to be conducted at the Geelong Hospital from April to November, 1946, at 8.30 p.m., on the third Wednesday of each month. The programme is as follows:

April 17: "Medical Emergencies", by Dr. L. Hurley.
May 15: "Modern Treatment of Common Skin Conditions", by Dr. John Kelly.
June 19: "Recent Advances in Therapeutics", by Dr. B. L. Stanton.
July 17: "Genito-Urinary Surgery", by Mr. H. Mortensen.
August 21: "Common Obstetrical Problems", by Dr. Arthur Wilson.
September 18: "Gynæcological Problems", by Dr. J. W. Johnstone.
October 16: "Chronic Infections of the Lung", by Dr. W. S. Newton.
November 20: "Anal Surgery", by Mr. J. Turner.

The fee for this course is £4 4s. Thise intending to be present are asked to communicate with Dr. Alan Kidd, "Omagh", 216, High Street, Belmont. (Telephone: Geelong 2857.)

THE NEW SOUTH WALES POST-GRADUATE COMMITTEE IN MEDICINE.

FILM PROGRAMME AT SYDNEY.

THE New South Wales Post-Graduate Committee in Medicine announces that the following film programme will be shown at the Stawell Memorial Hall, Royal Australasian College of Physicians' Building, 145, Macquarie Street, Sydney, at 4.15 p.m. on Wednesday, April 17, 1946: (i) "Riboflavin Deficiency"; (ii) "Nicotinic Acid Deficiency".

This film afternoon forms part of the annual general course conducted by the New South Wales Post-Graduate Committee in Medicine, and service medical personnel are invited to attend.

Obituary.

HERBERT MICHAEL MORAN.

DR. V. J. KINSELLA writes:

To the obituary notice of the late H. M. Moran, written by one of his contemporaries, Dr. E. H. Molesworth, I would like to add, from a younger generation, a grateful tribute which should not go unrecorded. Many men have achieved efficiency, even eminence, in their profession, in sport and in literature. But Moran radiated an indefinable atmosphere which depended upon a quality more precious than all these. C.F.E., in the *British Medical Journal*, referred to him as the "guardian angel" of the team of young footballers which he led overseas. This description may equally well be applied to him in the succeeding years. The help which he so freely gave to young men, the influence for good which he wielded with them, and his charm, were a part of him, not only in his football days. In those anxious transition periods when they go out into the world from the cloistered life of their hospital, knowing not which way to turn, or, when they plan to move from country to city; or from general practice to specialty, many young men, harassed by doubts and difficulties, turned naturally to Moran for help, and were not disappointed. His memory for their problems, and his sympathy, were not short-lived, but remained with him. I have before me a letter which he wrote in regard to my projected "wander-year". He was able to tell me of nine other medical men, from different parts of the State, who were also shortly to leave for Europe, and of their ship, and of their itinerary. I have no doubt that all of these had, like myself, gone to "Paddy" for advice.

And in this last farewell, can one forget the occasion when, with notice of only a day or two, men from all walks of life, and as if spontaneously, filled to overflowing the

large reception room in a city hotel, in order that he should not leave this country without some demonstration from those who owed him so much of friendship and of gratitude.

JOSEPH THOM TENNENT.

We regret to announce the death of Dr. Joseph Thom Tennent, which occurred on April 6, 1946, at Killara, New South Wales.

Nominations and Elections.

The undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Gibson, Charles John Harte, M.B., B.S., 1935 (Univ. Sydney), 3A, Henson Street, Summer Hill.

Walker, Reginald Lavis, M.B., B.S., 1945 (Univ. Sydney), 2, Woodville Street, Hurstville.

Brown, Lyle Arthur, M.B., B.S., 1945 (Univ. Sydney), Base Hospital, Lismore, New South Wales.

THE FEDERAL MEDICAL WAR RELIEF FUND.

The following contributions to the Federal Medical War Relief Fund have been received.

Tasmania.

Dr. W. E. L. H. Crowther, £100.
Dr. Cedric Duncombe, £25.
Dr. R. J. D. Turnbull, £20.
Dr. J. S. Stevens, Dr. F. C. Robertson, £10 10s.
Dr. C. Walch, Dr. F. Phillips, Dr. R. Whishaw, £10.
Dr. G. H. Hogg, Dr. M. J. Walker, Dr. P. Dorney, Dr. Spencer Roberts, Dr. W. Smellie, £5 5s.
Dr. D. Parker, £1 1s.
Total: £223 6s.
Grand total: £5,726 17s. 3d.

Notice.

THE SPECIAL REPRESENTATIVE MEETING IN MAY.

It has been decided as we go to press that Dr. J. G. Hunter, General Secretary of the Federal Council, will attend the Special Representative Meeting of the British Medical Association to be held at London on May 1, 1946, provided arrangements for travelling can be made.

Books Received.

"Modern Practical Nursing Procedures", by M. K. Doherty, R.R.C., M. B. Siri and O. I. Ring; Second Edition; 1946. Sydney: Dymock's Book Arcade Limited. 8¼" × 5¼", pp. 528. Price: 14s. 6d.

"Studies in Hypertony and the Prevention of Disease", by I. Harris, M.D., in cooperation with J. T. Ireland, B.Sc., A.I.C., G. V. James, M.Sc., A.I.C., Edward Cronin Lowe, M.B.E., M.B., B.S., and C. E. Vernon, M.Sc., A.I.C.; 1946. Bristol: John Wright and Sons Limited; London: Simpkin Marshall (1941) Limited. 7½" × 5", pp. 120, with illustrations. Price: 12s. 6d.

Medical Appointments.

Dr. W. C. Sangster has been appointed honorary consulting aural surgeon at the Royal Adelaide Hospital, Adelaide.

Dr. A. C. McEachern has been appointed honorary assistant surgeon, and Dr. R. L. Verco has been appointed honorary clinical assistant to the gynæcological section, at the Royal Adelaide Hospital, Adelaide.

Dr. T. H. R. Mathewson has been appointed a member of the Nurses and Masseurs Registration Board, Queensland, in pursuance of the provisions of *The Nurses and Masseurs Registration Acts, 1928 to 1940.*

Diary for the Month.

April 16.—New South Wales Branch, B.M.A.: Medical Politics Committee.
April 16.—New South Wales Branch, B.M.A.: Ethics Committee.
April 16.—New South Wales Branch, B.M.A.: Clinical Meeting.
April 17.—Western Australian Branch, B.M.A.: General Meeting.
April 18.—Victorian Branch, B.M.A.: Executive Meeting.
April 18.—South Australian Branch, B.M.A.: Council Meeting.
April 24.—Victorian Branch, B.M.A.: Council Meeting.
April 25.—South Australian Branch, B.M.A.: Scientific Meeting.
April 26.—Queensland Branch, B.M.A.: Council Meeting.
April 26.—New South Wales Branch, B.M.A.: Branch Meeting.
May 1.—Western Australian Branch, B.M.A.: Council Meeting.
May 1.—Victorian Branch, B.M.A.: Branch Meeting.
May 2.—South Australian Branch, B.M.A.: Council Meeting.
May 3.—Queensland Branch, B.M.A.: Branch Meeting.
May 7.—New South Wales Branch, B.M.A.: Organisation and Science Committee.
May 10.—Queensland Branch, B.M.A.: Council Meeting.
May 14.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
May 14.—Tasmanian Branch, B.M.A.: Ordinary Meeting.

Medical Appointments: Important Notice.

Medical practitioners are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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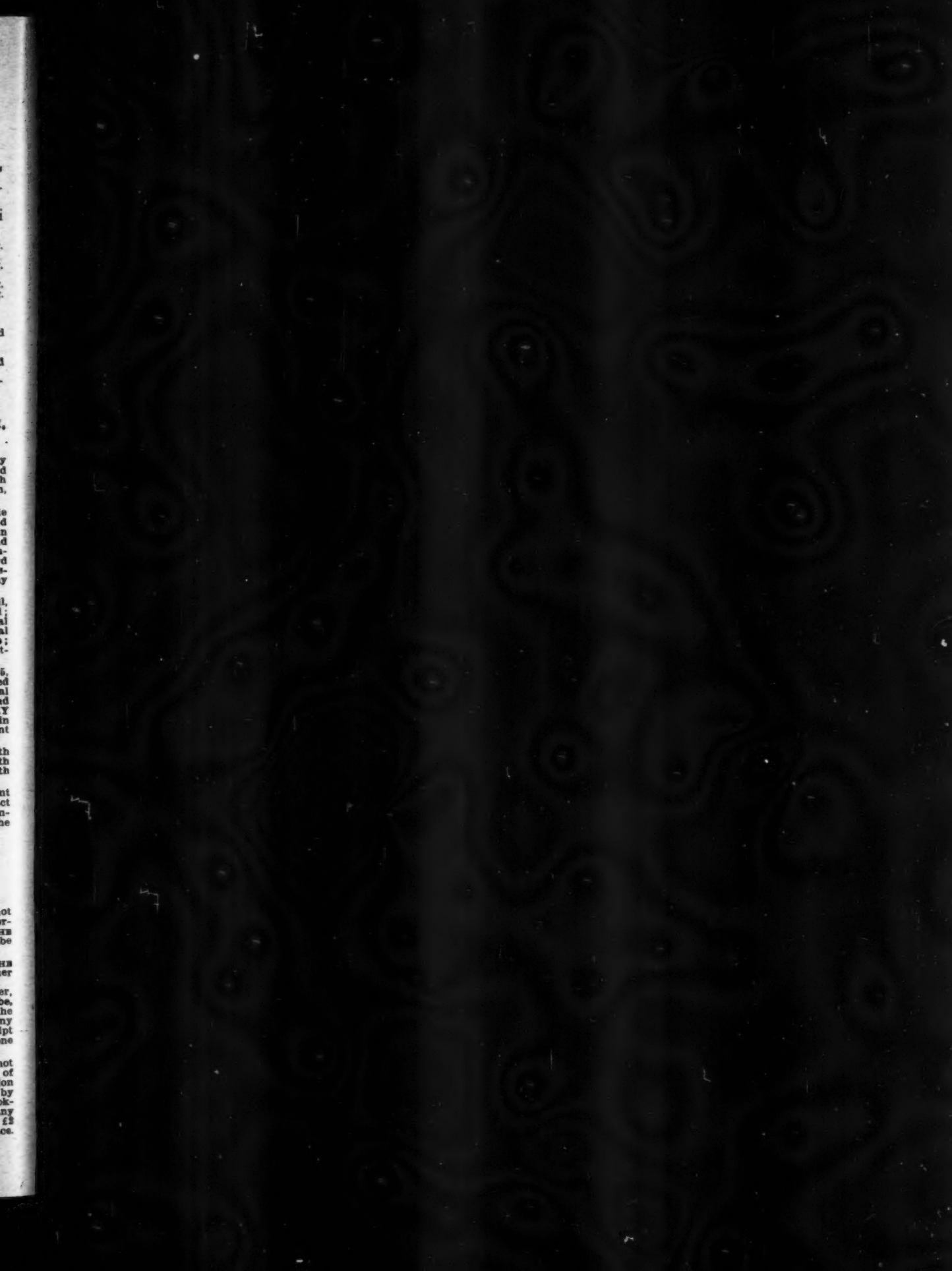
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